



Cisco 2600 Series Routers Hardware Installation Guide

Corporate Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

Text Part Number: OL-2171-06



THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The following information is for FCC compliance of Class A devices: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

The following information is for FCC compliance of Class B devices: The equipment described in this manual generates and may radiate radio-frequency energy. If it is not installed in accordance with Cisco's installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

Modifying the equipment without Cisco's written authorization may result in the equipment no longer complying with FCC requirements for Class A or Class B digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

Modifications to this product not authorized by Cisco Systems, Inc. could void the FCC approval and negate your authority to operate the product.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

CCSP, the Cisco Square Bridge logo, Cisco Unity, Follow Me Browsing, FormShare, and StackWise are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, and iQuick Study are service marks of Cisco Systems, Inc.; and Aironet, ASIST, BPX, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Empowering the Internet Generation, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, GigaDrive, GigaStack, HomeLink, Internet Quotient, IOS, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, LightStream, Linksys, MeetingPlace, MGX, the Networkers logo, Networking Academy, Network Registrar, *Packet*, PIX, Post-Routing, Pre-Routing, ProConnect, RateMUX, Registrar, ScriptShare, SlideCast, SMARTnet, StrataView Plus, SwitchProbe, TeleRouter, The Fastest Way to Increase Your Internet Quotient, TransPath, and VCO are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0406R)

Cisco 2600 Series Routers Hardware Installation Guide

Copyright © 2000-2004 Cisco Systems, Inc.

All rights reserved.



Preface vii

Objectives	vii
Audience	viii
Organization	viii
Conventions	viii
Safety Warnings	ix
Related Documentation	xiv
Cisco 90-Day Limited Hardware Warranty Terms	xvi
Obtaining Documentation	xvii
Cisco.com	xvii
Ordering Documentation	xvii
Documentation Feedback	xvii
Obtaining Technical Assistance	xviii
Cisco Technical Support Website	xviii
Submitting a Service Request	xviii
Definitions of Service Request Severity	xix
Obtaining Additional Publications and Information	xix

CHAPTER 1

Overview of Cisco 2600 Series Routers 1-1

Hardware Features	1-1
Reading the Front-Panel LEDs	1-3
Reading the Rear-Panel LEDs	1-5
Modules, Interface Cards, and Memory	1-8
Interface Numbering	1-9
WAN and LAN Interface Numbering	1-9
Voice Interface Numbering	1-11
System Specifications	1-11
Regulatory Compliance	1-12

CHAPTER 2

Preparing to Install the Router 2-1

Safety Recommendations	2-1
Safety with Electricity	2-1
Preventing Electrostatic Discharge Damage	2-2

General Site Requirements	2-3
Power Supply Considerations	2-3
Site Environment	2-3
Site Configuration	2-4
Equipment Racks	2-4
Installation Checklist	2-4
Creating a Site Log	2-5
Inspecting the Router	2-6
Tools and Equipment for Installation and Maintenance	2-6
Console and Auxiliary Port Considerations	2-7
Console Port Connections	2-7
Auxiliary Port Connections	2-8
Preparing to Connect to a Network	2-8
Ethernet Connections	2-9
Token Ring Connections	2-9
Serial Connections	2-10
Configuring Serial Connections	2-10
Serial DTE or DCE Devices	2-10
Signaling Standards Supported	2-11
Distance Limitations	2-11
Asynchronous/Synchronous Serial Module Baud Rates	2-12
ISDN BRI Connections	2-12
56-K/Switched-56-kbps DSU/CSU Connections	2-13

CHAPTER 3

Installing the Router 3-1

Installing Modules, Interface Cards, and Power Supplies	3-2
Setting Up the Chassis	3-3
Setting the Chassis on a Desktop	3-3
Mounting the Chassis in a Rack	3-4
Attaching the Brackets to Cisco 261x, Cisco 262x, Cisco 26xxXM, and Cisco 265x Series Routers	3-5
Attaching the Brackets to a Router of 2-RU Height	3-9
Installing the Router in a Rack	3-10
Mounting the Chassis on the Wall	3-11
Attaching Rubber Feet to the Router	3-11
Attaching Wall-Mount Brackets to the Router	3-11
Mounting the Router on the Wall	3-12
Installing the Chassis Ground Connection	3-13
Power Connections	3-15

Connecting Routers to AC Power	3-15
Connecting Routers to a DC-Input Power Supply	3-16
DC Wiring Requirements	3-16
Connecting Routers to the Cisco Redundant Power System	3-18
Connecting WAN, LAN, and Voice Cables	3-18
Ports and Cabling	3-18
LAN, WAN, and Voice Connection Procedures	3-19
Connecting to a Console Terminal or Modem	3-20
Connecting to the Console Port	3-20
Connecting to the Auxiliary Port	3-21
Identifying a Rollover Cable	3-22
Powering Up the Router	3-23
Checklist for Power Up	3-23
Front Panel Indicators	3-23
Power-Up Procedure	3-24
Configuring the Router	3-25
Initial Configuration Using SDM	3-26
Initial Configuration Using the Setup Command Facility	3-26
Initial Configuration Using the CLI (Manual Configuration)	3-28

APPENDIX A

Troubleshooting A-1

Isolating Problems	A-1
Troubleshooting the Power and Cooling Systems	A-2
Environmental Reporting Features	A-2
Troubleshooting Modules, Cables, and Connections	A-3
System Messages	A-4
Recovering a Lost Password	A-4
Cisco Technical Assistance Center	A-4

APPENDIX B

Using the ROM Monitor B-1

Entering ROM Monitor Mode	B-1
ROM Monitor Commands	B-2
ROM Monitor Command Syntax Conventions	B-3
ROM Monitor Command Descriptions	B-4
Router Management Commands	B-4
Boot Commands in the ROM Monitor	B-4
Informational Commands in the ROM Monitor	B-5
Other Useful ROM Monitor Commands	B-6

Debugging Commands	B-6
Configuration Register Commands	B-7
Recovering Cisco IOS Software Images	B-8
Copying an Image from the Console Using the xmodem Command	B-9
Description and Options of the xmodem Command	B-9
Console Requirements	B-9
Procedure for the xmodem Command	B-9
Copying an Image from a TFTP Server Using the tftpdnld Command	B-10
Restrictions on the tftpdnld Command	B-10
Procedure for the tftpdnld Command	B-11

APPENDIX C

Configuration Register	1-1
Configuration Register Settings	1-1
Changing Configuration Register Settings	1-2
Configuring the Boot Field	1-3
Enabling Booting from Flash Memory	1-5

INDEX



Preface

This preface discusses the objectives, audience, organization, and conventions of this hardware installation guide, and points to related documents that have information beyond the scope of this document. It contains the following sections:

- [Objectives, page vii](#)
- [Audience, page viii](#)
- [Organization, page viii](#)
- [Conventions, page viii](#)
- [Safety Warnings, page ix](#)
- [Related Documentation, page xiv](#)
- [Cisco 90-Day Limited Hardware Warranty Terms, page xvi](#)
- [Obtaining Documentation, page xvii](#)
- [Documentation Feedback, page xvii](#)
- [Obtaining Technical Assistance, page xviii](#)
- [Obtaining Additional Publications and Information, page xix](#)

Objectives

This guide explains how to install, maintain, and troubleshoot your router hardware. It also includes instructions for the router ROM monitor and configuration register.

Although this document provides minimum software configuration information, it is not comprehensive. For detailed software configuration information, refer to the [Software Configuration Guide for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers](#) and to the Cisco IOS configuration guides and command reference publications. See the “[Obtaining Documentation](#)” section on page xvii for more information.

This guide describes several router models that are similar in functionality, but differ in the number of interfaces supported. Some information provided may not apply to your particular router model.

To access the warranty, service, and support information, see the “[Cisco 90-Day Limited Hardware Warranty Terms](#)” section on page xvi.

Audience

This guide is designed for the person installing the router, who should be familiar with electronic circuitry and wiring practices and should have experience as an electronic or electromechanical technician. It identifies certain procedures that should be performed only by trained and qualified personnel.

Organization

Table 1 *Document Organization*

Chapter	Title	Description
Chapter 1	Overview of Cisco 2600 Series Routers	Discusses the features and specifications of Cisco 2600 series routers.
Chapter 2	Preparing to Install the Router	Discusses environmental requirements, safety recommendations, and describes the various ports and how to prepare for connections between networks and ports.
Chapter 3	Installing the Router	Includes basic installation information and discusses making connections to your LAN, WAN, and console terminal.
Appendix A	Troubleshooting	Discusses how to isolate problems and read the LEDs.
Appendix B	Using the ROM Monitor	Discusses selected maintenance procedures.
Appendix C	Configuration Register	Describes the ROM monitor (also called the bootstrap program). Use the ROM monitor to help you isolate or rule out hardware problems encountered during installation.

Conventions

This guide uses the following conventions to convey instructions and information.

Table 2 *Document Conventions*

Convention	Description
boldface font	Commands and keywords.
<i>italic font</i>	Variables for which you supply values.
[]	Keywords or arguments that appear within square brackets are optional.
{ x y z }	A choice of required keywords appears in braces separated by vertical bars. You must select one.
screen font	Examples of information displayed on the screen.
boldface screen font	Examples of information you must enter.
< >	Nonprinting characters; for example passwords appear in angle brackets in contexts where italic font is not available.
[]	Default responses to system prompts appear in square brackets.

**Note**

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

**Timesaver**

Means *the described action saves time*. You can save time by performing the action described in the paragraph.

**Tip**

Means *the following information will help you solve a problem*. The tips information might not be troubleshooting or even an action, but could be useful information, similar to a Timesaver.

**Caution**

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, may harm you. A warning symbol precedes each warning statement. To see translations of the warnings that appear in this publication, refer to the [Regulatory Compliance and Safety Information](#) document that accompanied your router.

**Warning**

IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

Waarschuwing

BELANGRIJKE VEILIGHEIDSINSTRUCTIES

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus TÄRKEITÄ TURVALLISUUSOHJEITA

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET**Attention IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS**Warnung WICHTIGE SICHERHEITSHINWEISE**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.**Avvertenza IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI**Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES**¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES**Varning! VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR**Figyelem FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejte helyzetben van. Mielőtt bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplő figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján kereshető meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!**Предупреждение ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告 重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

주의 중요 안전 지침

이 경고 기호는 위험을 나타냅니다. 작업자가 신체 부상을 일으킬 수 있는 위험한 환경에 있습니다. 장비에 작업을 수행하기 전에 전기 회로와 관련된 위험을 숙지하고 표준 작업 관례를 숙지하여 사고를 방지하십시오. 각 경고의 마지막 부분에 있는 경고문 번호를 참조하여 이 장치와 함께 제공되는 번역된 안전 경고문에서 해당 번역문을 찾으십시오.

이 지시 사항을 보관하십시오.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.

GUARDE ESTAS INSTRUÇÕES**Advarsel** VIGTIGE SIKKERHEDSANVISNINGER

Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemeskadeskade. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.

GEM DISSE ANVISNINGER**تحذير****إرشادات الأمان الهامة**

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض لإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في آخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز. قم بحفظ هذه الإرشادات

Upozorenje VAŽNE SIGURNOSNE NAPOMENE

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

SAČUVAJTE OVE UPUTE**Upozornění DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY**

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznámte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

USCHOVEJTE TYTO POKYNY**επικίνδυνη τάση ή****ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ**

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθειες πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ**אזהרה****הוראות בטיחות חשובות**

אימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד: לשהו, עליך להיות מודע לסכנות הכרוכות במעגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כדי לאתר את התרגום מאזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה

Опomena постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.
ЧУВАЈТЕ ГИ ОБИЕ НАПАТСТВИЈА

Ostrzeżenie **WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA**

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Related Documentation

The Cisco IOS software running your Cisco 2600 series router includes extensive features and functionality. For information that is beyond the scope of this document, or for additional information, use the following resources:



Timesaver

Make sure that you have access to the documents listed in [Table 3](#). Some of these documents are available in print, and all are on CD-ROM and on the World Wide Web. If you need to order printed documents, see the [“Obtaining Documentation”](#) section on page xvii.

Table 3 **Related and Referenced Documents**

Cisco Product	Document Title
Cisco 2600 series routers	Cisco 2600 Series Modular Routers Quick Start Guide
	Cisco Modular Access Router Cable Specifications
	Cisco Redundant Power System Hardware Installation Guide
	Quick Start Guide: Network Modules for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers
	Cisco Network Modules Hardware Installation Guide
	Quick Start Guide: Interface Cards for Cisco 1600, 1700, 2600, 3600, and 3700 Series
	Cisco Interface Cards Hardware Installation Guide
	Upgrading System Memory in Cisco 2600 Series Routers
	Installing and Formatting Cisco 2691, Cisco 3631, and Cisco 3700 Compact Flash Memory Cards
	AIM Installation Quick Start Guide: Cisco 2600, 3600, and 3700 Series
	Installing Advanced Integration Modules in Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers
	Installing the Cisco 2600 Series NEBS Level 3/ETSI Compliance Kit
	Installing AC Power Supplies in Cisco 2691 Routers
	Cisco 2600 Series Power Supply Configuration Note
	Installing a Cisco 2691 Redundant Power Supply Interface Module in the Cisco 2691 Router
	Cisco RPS Hardware Installation Guide
	BootROM Installation for Cisco 2620 and Cisco 2621 Routers
	Alarm Interface Controller Patch Panel Installation Guide
	Software Configuration Guide for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers
	Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information
Network management system	Network management software documentation http://www.cisco.com/univercd/cc/td/doc/product/rtrmgmt/index.htm
Cisco IOS software	Cisco IOS software documentation , all releases http://www.cisco.com/univercd/cc/td/doc/product/software/index.htm Refer to the documentation for the Cisco IOS software release installed on your router.

Cisco 90-Day Limited Hardware Warranty Terms

There are special terms applicable to your hardware warranty and various services that you can use during the warranty period. Your formal Warranty Statement, including the warranties and license agreements applicable to Cisco software, is available on Cisco.com. Follow these steps to access and download the *Cisco Information Packet* and your warranty and license agreements from Cisco.com.

1. Launch your browser, and go to this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpk/cetrans.htm

The Warranties and License Agreements page appears.

2. To read the *Cisco Information Packet*, follow these steps:

- a. Click the **Information Packet Number** field, and make sure that the part number 78-5235-03A0 is highlighted.
- b. Select the language in which you would like to read the document.
- c. Click **Go**.

The Cisco Limited Warranty and Software License page from the Information Packet appears.

- d. Read the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).



Note

You must have Adobe Acrobat Reader to view and print PDF files. You can download the reader from Adobe's website: <http://www.adobe.com>

3. To read translated and localized warranty information about your product, follow these steps:

- a. Enter this part number in the Warranty Document Number field:
78-5236-01C0
- b. Select the language in which you would like to read the document.
- c. Click **Go**.

The Cisco warranty page appears.

- d. Review the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).

You can also contact the Cisco service and support website for assistance:

http://www.cisco.com/public/Support_root.shtml.

Duration of Hardware Warranty

Ninety (90) days.

Replacement, Repair, or Refund Policy for Hardware

Cisco or its service center will use commercially reasonable efforts to ship a replacement part within ten (10) working days after receipt of a Return Materials Authorization (RMA) request. Actual delivery times can vary, depending on the customer location.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

To Receive a Return Materials Authorization (RMA) Number

Contact the company from whom you purchased the product. If you purchased the product directly from Cisco, contact your Cisco Sales and Service Representative.

Complete the information below, and keep it for reference:

Company product purchased from	
Company telephone number	
Product model number	
Product serial number	
Maintenance contract number	

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpc/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:
<http://www.cisco.com/en/US/partner/ordering/index.shtml>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 1 800 553-NETS (6387).

Documentation Feedback

You can send comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, Cisco Technical Support provides 24-hour-a-day, award-winning technical assistance. The Cisco Technical Support Website on Cisco.com features extensive online support resources. In addition, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not hold a valid Cisco service contract, contact your reseller.

Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year, at this URL:

<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>



Note

Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support Website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

<http://www.cisco.com/go/marketplace/>

- The Cisco *Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the Cisco Product Catalog at this URL:

<http://cisco.com/univercd/cc/td/doc/pcat/>

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:
<http://www.cisco.com/packet>
- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:
<http://www.cisco.com/go/iqmagazine>
- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:
<http://www.cisco.com/ipj>
- World-class networking training is available from Cisco. You can view current offerings at this URL:
<http://www.cisco.com/en/US/learning/index.html>



Overview of Cisco 2600 Series Routers

Cisco 2600 series routers are modular access routers with LAN and WAN connections that can be configured by means of interchangeable modules and WAN interface cards.

This guide discusses the router models listed in [Table 1-1](#).

This chapter includes the following sections:

- [Hardware Features, page 1-1](#)
- [Reading the Front-Panel LEDs, page 1-3](#)
- [Reading the Rear-Panel LEDs, page 1-5](#)
- [Interface Numbering, page 1-9](#)
- [System Specifications, page 1-11](#)
- [Regulatory Compliance, page 1-12](#)

Hardware Features

[Table 1-1](#) lists the router models described in this guide and summarizes the LAN interfaces supported on each model. These router models are similar in functionality, but differ in the number of interfaces that are supported as well as the system specifications. (See [Table 1-6](#).)

Table 1-1 Summary of Cisco 2600 Series LAN Interfaces

Model	Ethernet (10BASE-T)	Token Ring (RJ-45)	Fast Ethernet (10/100)	Network Module Slot	WAN Interface Card Slots	Advanced Integration Module Slots
Cisco 2610	1	—	—	1	2	1
Cisco 2610XM	—	—	1	1	2	1
Cisco 2611	2	—	—	1	2	1
Cisco 2611XM	—	—	2	1	2	1
Cisco 2612	1	1	—	1	2	1
Cisco 2613	—	1	—	1	2	1
Cisco 2620	—	—	1	1	2	1
Cisco 2620XM	—	—	1	1	2	1
Cisco 2621	—	—	2	1	2	1

Table 1-1 Summary of Cisco 2600 Series LAN Interfaces (continued)

Model	Ethernet (10BASE-T)	Token Ring (RJ-45)	Fast Ethernet (10/100)	Network Module Slot	WAN Interface Card Slots	Advanced Integration Module Slots
Cisco 2621XM	—	—	2	1	2	1
Cisco 2650	—	—	1	1	2	1
Cisco 2650XM	—	—	1	1	2	1
Cisco 2651	—	—	2	1	2	1
Cisco 2651XM	—	—	2	1	2	1
Cisco 2691	—	—	2	1	3	2

In addition to the interfaces listed in [Table 1-1](#), Cisco 2600 series routers include the following hardware features:

- Dynamic random-access memory (DRAM) for main memory and shared memory (Cisco 261x and Cisco 262x routers)
- Synchronous dynamic random-access memory (SDRAM) for main memory and shared memory (Cisco 26xxXM, Cisco 265x, and Cisco 2691 routers)
- Nonvolatile random-access memory (NVRAM) for storing configuration information
- Flash memory—Stores the operating system software image. In Cisco 2691 routers, flash memory is a CompactFlash memory card. In all other Cisco 2600 series routers, flash memory is a single inline memory module (SIMM).
- EIA/TIA-232 (RJ-45) console port for local system access by using a console terminal
- EIA/TIA-232 (RJ-45) auxiliary port for remote system access or dial backup by using a modem

[Figure 1-1](#) and [Figure 1-2](#) show examples of Cisco 2600 series routers.

**Note**

Cisco 2600 series routers are either single rack-unit (1RU) or two rack-unit (2RU) high.

**Note**

The number and type of interfaces vary, depending on the specific router.

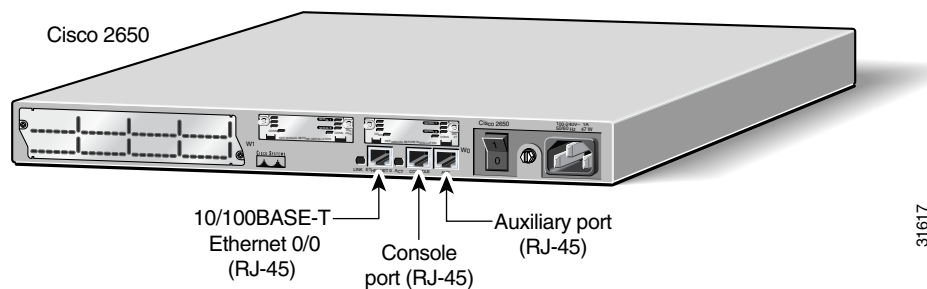
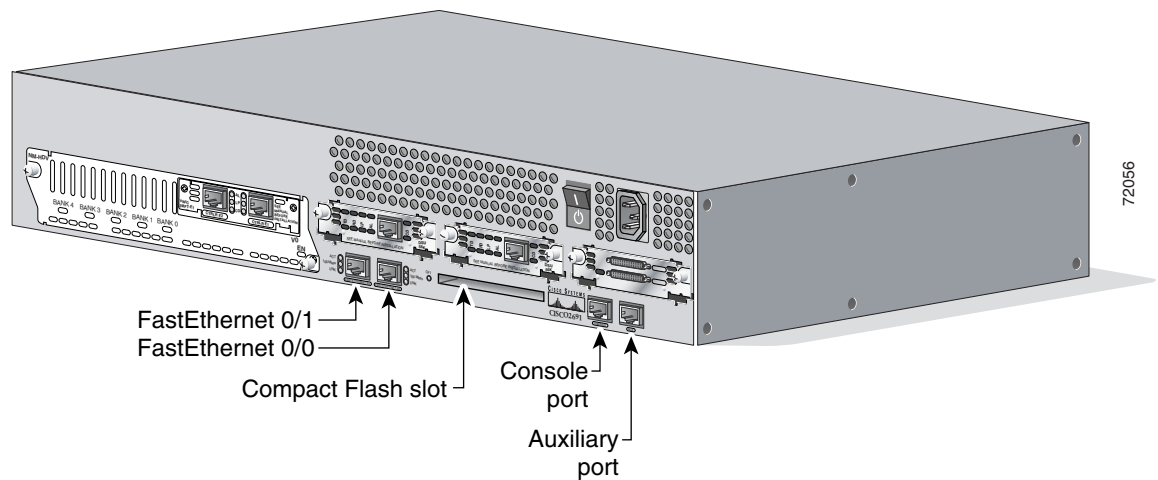
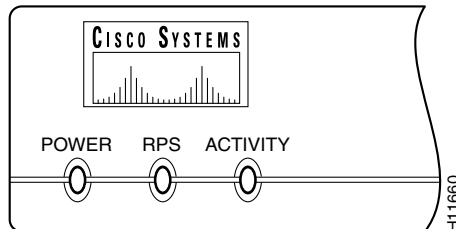
Figure 1-1 Cisco 2600 Series Router Rear Panel—Example of 1RU Router

Figure 1-2 Cisco 2600 Series Router Rear Panel—Example of 2RU Router

Reading the Front-Panel LEDs

The LEDs indicate the current operating condition of the router. By observing the LEDs, you can note any fault condition that the router is encountering, and then contact your system administrator or customer service, when necessary.

Figure 1-3 and Figure 1-4 show the locations of the LEDs on the front panel of Cisco 2600 series routers. Table 1-3 and Table 1-3 describe these LEDs.

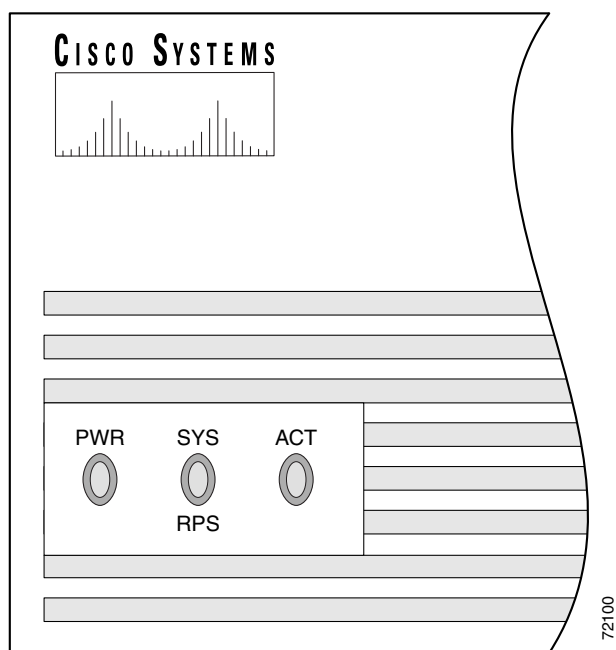
Figure 1-3 Cisco 2600 Series Routers with 1-RU Chassis Height—Front-Panel LEDs**Table 1-2 Cisco 2600 Series Routers with 1-RU Chassis Height—Front-Panel LED Descriptions**

LED	Description
POWER	Indicates the router's operating status. Comes on when power is supplied to the router and the router is operational.

Table 1-2 Cisco 2600 Series Routers with 1-RU Chassis Height—Front-Panel LED Descriptions

LED	Description (continued)
RPS	Off—No RPS ¹ is attached. On—RPS is attached and operational. Blinking—RPS is attached, but has a failure.
ACTIVITY	Off—In the Cisco IOS software, but no network activity. Blink (500 ms ON, 500 ms OFF)—In ROMMON, no errors. Blink (500 ms ON, 500 ms OFF, 2 seconds between codes)—In ROMMON, error detected. Blink (less than 500 ms)—In the Cisco IOS software, the blink rate reflects the level of activity.

1. RPS = Redundant Power System

Figure 1-4 Cisco 2691—Front-Panel LEDs**Table 1-3 Cisco 2691—Front-Panel LED Descriptions**

LED	Description
PWR	On—Power is applied to the router.
SYS/RPS	Rapid blinking—System is booting Slow blinking—System error On—System okay
ACTIVITY	Off—No system activity Blinking—System activity

Reading the Rear-Panel LEDs

Figure 1-4 through Figure 1-10 show the location of the Cisco 2600 series rear-panel LEDs. Table 1-4 and Table 1-5 describe these LEDs.



Note

Not all router models are shown in these illustrations. The speed and number of Ethernet and Token Ring interfaces varies depending on the router model. LED labels and functionality also vary depending on the router model.

Figure 1-5 Cisco 2611—Rear-Panel LEDs

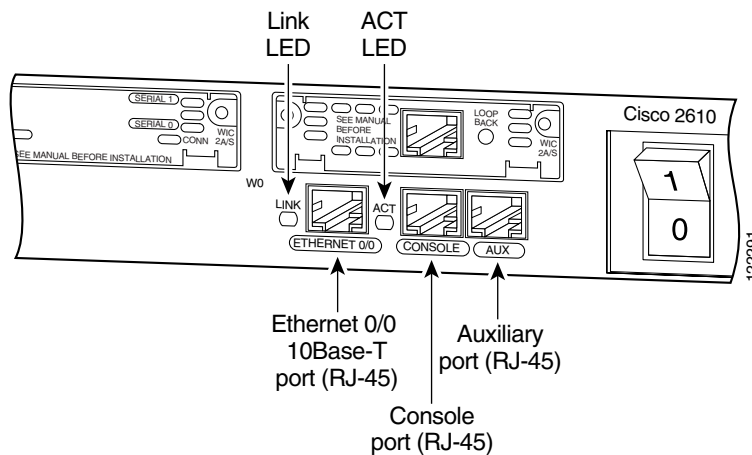


Figure 1-6 Cisco 2611—Rear-Panel LEDs

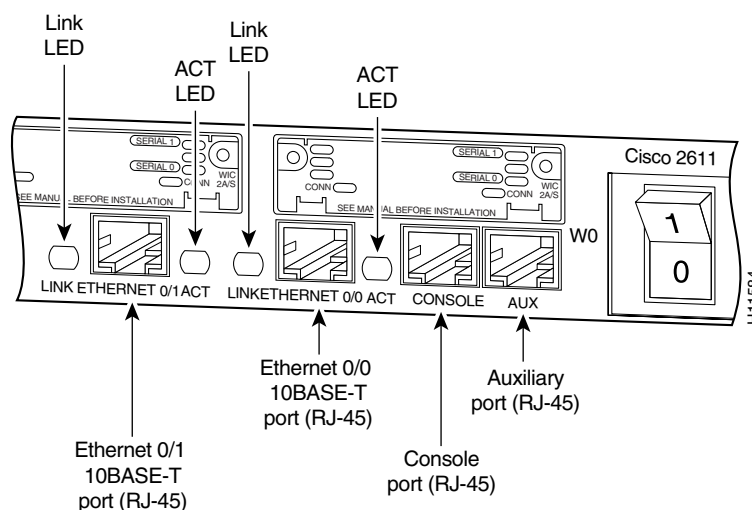


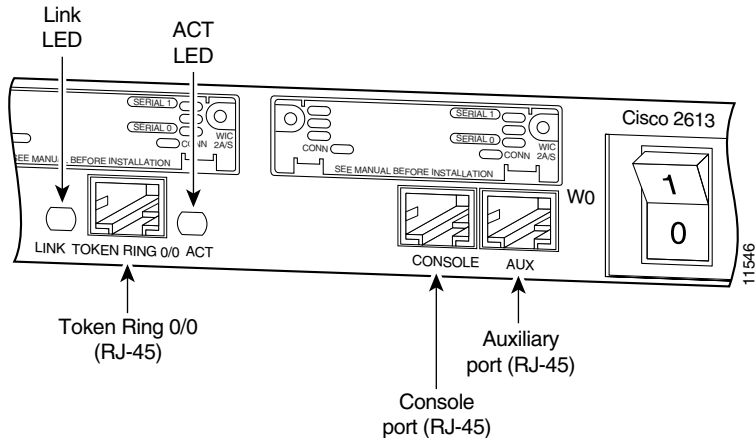
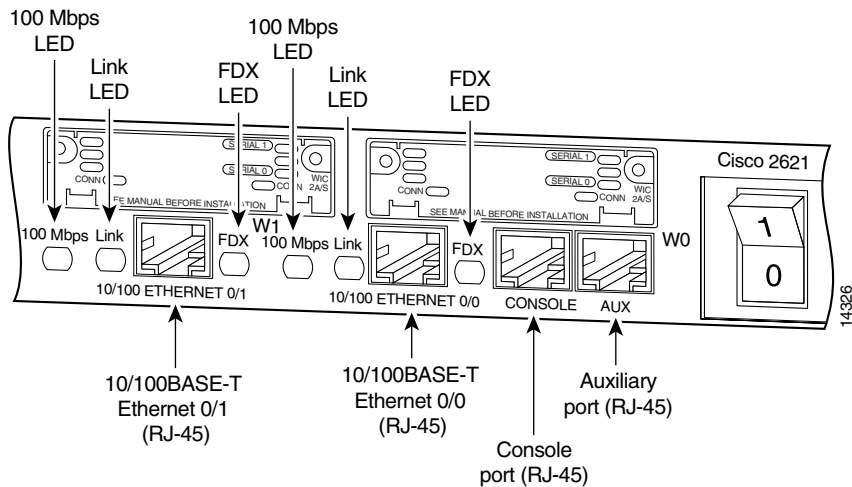
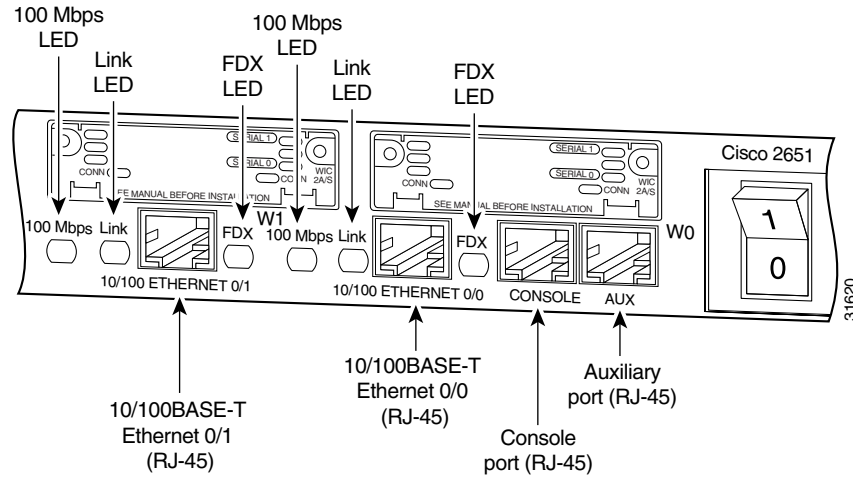
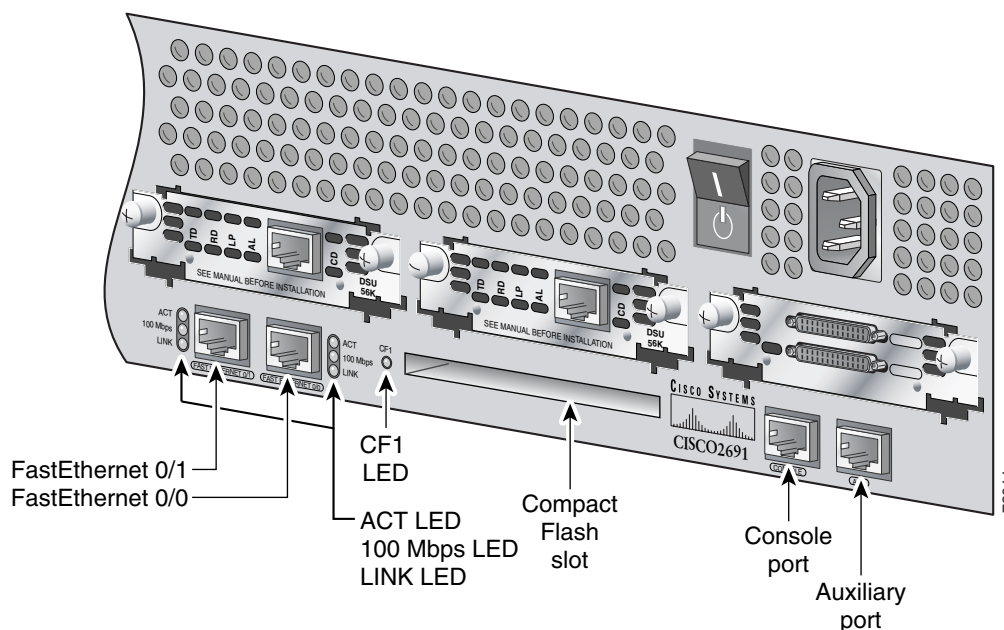
Figure 1-7 Cisco 2613—Rear-Panel LEDs**Figure 1-8 Cisco 2621—Rear-Panel LEDs**

Figure 1-9 Cisco 2651—Rear-Panel LEDs**Table 1-4 Cisco 261x, Cisco 262x, Cisco 26xxXM, and Cisco 265x Series Routers—Rear-Panel LEDs**

LED	Description
LINK	When on, a link has been established with the hub or switch at the other end of the cable.
ACT	Packets are being transmitted or received on the Ethernet interface.
FDX	When on, the interface is in full-duplex mode. When off, the interface is in half-duplex mode.
100 Mbps	When on, the speed of the interface is 100 Mbps. When off, the speed of the interface is 10 Mbps.

Figure 1-10 Cisco 2691—Rear-Panel LEDs**Table 1-5 Cisco 2691—Rear-Panel LEDs**

LED	Description
LINK	On when a link has been established with the hub or switch at the other end of the cable.
ACT	On when packets are being transmitted or received on the Ethernet interface.
100 Mbps	On when the speed of the interface is 100 Mbps. Off when the speed of the interface is 10 Mbps.
CF1	On when flash memory is being accessed—either READ or WRITE.

Modules, Interface Cards, and Memory

The latest information on network modules, WAN interface cards (WICs), voice interface cards (VICs), advanced integration modules (AIMs), and memory is available online and on the documentation CD-ROM.

- For information on installing network modules, refer to the following documents:
 - [Quick Start Guide: Network Modules for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers](#)
 - [Cisco Network Modules Hardware Installation Guide](#)
- For information on installing WICs and VICs, refer to the following documents:
 - [Quick Start Guide: Interface Cards for Cisco 1600, 1700, 2600, 3600, and 3700 Series](#)
 - [Cisco Interface Cards Installation Guide](#)

- For information on installing AIMs, refer to the following documents:
 - [AIM Installation Quick Start Guide: Cisco 2600, 3600, and 3700 Series](#)
 - [Installing Advanced Integration Modules in Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers](#)
- For information about installing DRAM, SDRAM, NVRAM, and flash memory SIMMs, refer to the following hardware configuration note:
 - [Upgrading System Memory, Internal Flash Memory, and Root ROM in Cisco 2600 Series Routers](#)
- For information about installing CompactFlash memory cards, refer to the following hardware configuration note:
 - [Installing and Formatting Cisco 2691, Cisco 3631, and Cisco 3700 Compact Flash Memory Cards](#)

Interface Numbering

Each interface (port) on a Cisco 2610, Cisco 2620, and Cisco 2650 series router is identified by number as described in the following sections.

WAN and LAN Interface Numbering

Cisco 2600 series routers contain the following WAN and LAN interface types:

- Built-in LAN interfaces: Ethernet, FastEthernet, Token Ring
- Two or three slots in which you can install WAN interface cards (WICs)
- One slot in which you can install a network module

The numbering format is *interface-type slot-number/Interface-number*. Two examples are:

- Ethernet 0/0
- Serial 1/2

The slot number is 0 for all built-in interfaces and 0 for all WIC interfaces; the slot number is 1 for network module interfaces.

Interface (port) numbers begin at 0 for each interface type, and continue from right to left and (if necessary) from bottom to top.

Figure 1-11 shows a router of 1-RU height with:

- A WIC in each WIC slot (containing interface Serial 0/0 in physical slot W0, and interface Serial 0/1 in physical slot W1)
- A 4-serial-port network module in slot 1 (containing the following ports: Serial 1/0, Serial 1/1, Serial 1/2, and Serial 1/3)
- First built-in Ethernet interface—Ethernet 0/0
- Second built-in Ethernet interface—Ethernet 0/1, or optionally in Cisco 2612 and Cisco 2613 routers only: Token Ring interface 0/0

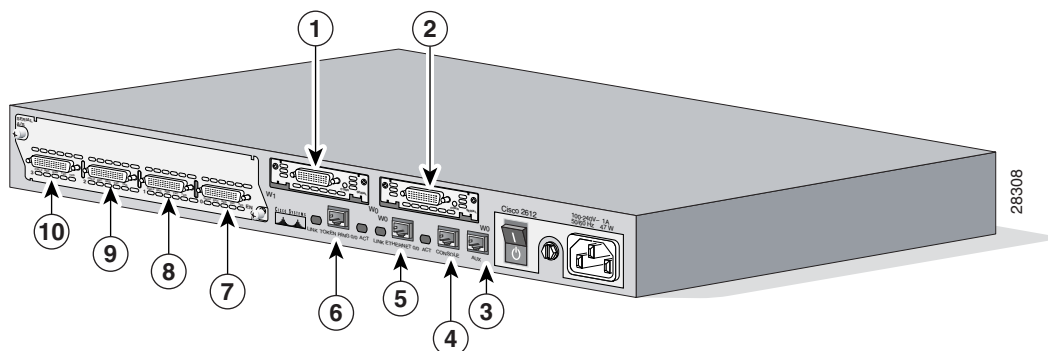
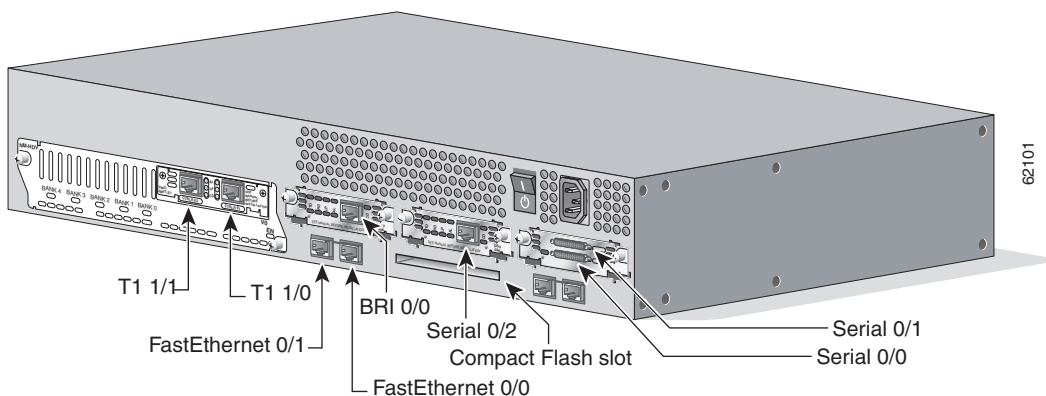
Figure 1-11 Interface Numbering in Chassis with 1-RU Height

Figure 1-12 shows a router of 2-RU height with:

- A 2-port T1 network module in slot 1 (containing the following ports: T1 1/0 and T1 1/1)
- Two built-in Ethernet 10/100 interfaces—Fast Ethernet 0/0 and Fast Ethernet 0/1
- A WIC in each WIC slot (containing interfaces Serial 0/0 and Serial 0/1 in physical slot W0, interface Serial 0/2 in physical slot W1, and interface BRI 0/0 in physical slot W2)
 - If physical slot W0 is empty and physical slot W1 contains a 1-port serial WIC, the interface number in the WIC is numbered Serial 0/0.
 - If slot W0 contains a 2-port serial WIC and slot W1 contains a 1-port serial WIC, the interfaces in physical slot W0 are numbered Serial 0/0 and Serial 0/1, and the interface in physical slot W1 is numbered Serial 0/2.
 - If slot W0 contains a 2-port serial WIC and slot W1 contains a 1-port BRI WIC, the interfaces in physical slot W0 are numbered Serial 0/0 and Serial 0/1, and the interface in physical slot W1 is numbered BRI 0/0.

**Note**

The slot number for all WIC interfaces is always 0. (The W0 and W1 slot designations are for physical slot identification only.) Interfaces in the WICs are numbered from right to left, starting with 0/0 for each interface type, regardless of which physical slot the WICs are installed in.

Figure 1-12 Interface Numbering in Cisco 2691 Routers

Voice Interface Numbering

Voice interfaces are numbered as follows:

chassis-slot/voice-module-slot/voice-interface

If a 4-channel voice network module is installed in chassis slot 1, the voice interfaces are:

- 1/0/0—Chassis slot 1/Voice module slot 0/Voice interface 0
- 1/0/1—Chassis slot 1/Voice module slot 0/Voice interface 1
- 1/1/0—Chassis slot 1/Voice module slot 1/Voice interface 0
- 1/1/1—Chassis slot 1/Voice module slot 1/Voice interface 1

System Specifications

Table 1-6 Cisco 261x, Cisco 262x, and Cisco 265x System Specifications

Description	Specification
Dimensions (H x W x D)	1.69 x 17.5 x 11.8 in. (4.3 x 44.5 x 30 cm), one rack unit height
Weight	10.25 lb (4.66 kg)
Input voltage, AC power supply	100 to 240 VAC
Current	1.5 A
Frequency	47 to 63 Hz
Power dissipation	75 W (maximum), 260 Btus ¹ /hr
Input voltage, DC power supply	–38 to –75 VDC
Current	2.0 A
Power dissipation	75 W (maximum), 260 Btus/hr
Operating environment	32 to 104°F (0 to 40°C)
Nonoperating temperature	–40 to 158°F (–40 to 70°C)
Operating humidity	5 to 95 percent, noncondensing
Noise level	38 dBA (minimum)
Regulatory compliance	FCC Class B and Canadian DOC Class A For more compliance information, refer to the Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information document that accompanied your router.
Safety compliance	UL 60950; CAN/CSA C22.2 No. 60950-00; IEC 60950; AS/NZS 3260; TS001

1. Btus = British thermal units

Table 1-7 Cisco 2691 System Specifications

Description	Specification
Dimensions (H x W x D)	3.46 x 17.07 x 11.20 in. (8.78 x 45.36 x 28.45 cm), two rack unit height
Weight	15 lb (6.80 kg)
Input voltage, AC power supply	100 to 120, 120 VAC 200 to 240, 230 VAC
Current emissions (AC)	0.93 min. @ 120 VAC 60 Hz (when loaded at 50% or higher 47 to 63 Hz
Frequency	160 VAC - 1/2 cycle
Line surge (120 VAC)	140 VAC - 5 cycles 320 VAC - 1/2 cycle
Line surge (240 VAC)	280 VAC - 5 cycles
Power dissipation	105 W (maximum)
Console and auxiliary ports	RJ-45 connector
Operating humidity	5 to 95%, noncondensing
Operating temperature	32 to 104°F (0 to 40°C)
Nonoperating temperature	–40 to 158°F (–40 to 70°C)
Noise level	45 dBA (maximum)
Regulatory compliance	FCC Part 15 Class A. For more compliance information, refer to the Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information document that accompanied the router.
Safety compliance	UL 60950; CAN/CSA C22.2 No. 60950-00; IEC 60950; AS/NZS 3260; TS001

Regulatory Compliance

For compliance information, refer to the [Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information](#) document that accompanied your router.



Preparing to Install the Router

This chapter describes important information to consider before you begin to install a Cisco 2600 series router, and includes the following sections:

- [Safety Recommendations, page 2-1](#)
- [General Site Requirements, page 2-3](#)
- [Installation Checklist, page 2-4](#)
- [Creating a Site Log, page 2-5](#)
- [Inspecting the Router, page 2-6](#)
- [Tools and Equipment for Installation and Maintenance, page 2-6](#)
- [Console and Auxiliary Port Considerations, page 2-7](#)
- [Preparing to Connect to a Network, page 2-8](#)

After you have completed this chapter, proceed to [Chapter 3, “Installing the Router”](#) for installation instructions.

Safety Recommendations

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- If you remove the chassis cover, put it in a safe place.
- Keep tools and chassis components away from walk areas.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses when working under conditions that might be hazardous to your eyes.
- Do not perform any action that creates a hazard to people or makes the equipment unsafe.

Safety with Electricity

Follow these guidelines when working on equipment powered by electricity:



Read the installation instructions before connecting the system to the power source. Statement 1004

- Locate the emergency power-off switch in the room in which you are working. Then, if an electrical accident occurs, you can quickly turn off the power.
- Disconnect all power before doing the following:
 - Installing or removing a chassis
 - Working near power supplies
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.
- Do not work alone if hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.
- If an electrical accident occurs, proceed as follows:
 - Use caution; do not become a victim yourself.
 - Turn off power to the device.
 - If possible, send another person to get medical aid. Otherwise, assess the victim's condition and then call for help.
 - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

In addition, use the following guidelines when working with any equipment that is disconnected from a power source, but still connected to telephone wiring or other network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for it.
- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. It can occur if electronic printed circuit cards are improperly handled and can cause complete or intermittent failures. Always follow ESD prevention procedures when removing and replacing modules:

- Ensure that the router chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to channel unwanted ESD voltages safely to ground. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.
- If no wrist strap is available, ground yourself by touching a metal part of the chassis.



Caution

For the safety of your equipment, periodically check the resistance value of the antistatic strap. It should be between 1 and 10 megohms (Mohm).

General Site Requirements

This section describes the requirements your site must meet for safe installation and operation of your router. Ensure that the site is properly prepared before beginning installation. If you are experiencing shutdowns or unusually high errors with your existing equipment, this section can also help you isolate the cause of failures and prevent future problems.

Power Supply Considerations

Check the power at your site to ensure that you are receiving “clean” power (free of spikes and noise). Install a power conditioner if necessary.

**Warning**

The device is designed for connection to TN and IT power systems. Statement 1007

The AC power supply includes the following features:

- Autoselects either 110-V or 220-V operation.
- All units include a 6-foot (1.8-meter) electrical power cord. (A label near the power cord indicates the correct voltage, frequency, current draw, and power dissipation for the unit.)

Table 2-1 describes power requirements for Cisco 2600 series routers.

Table 2-1 Power Requirements for Cisco 2600 Series Routers

Power Source	Input Power	Input Voltage Tolerance Limits
AC	100 - 240 VAC, 1.0 A, 50 - 60 Hz	85 - 264 VAC
DC	48 - 60 VDC, 3.0 A	38 - 72 VDC

Site Environment

The router can be placed on a desktop or mounted in a rack. Single rack-unit (1RU) routers can also be mounted on a wall. The location of the chassis and the layout of your equipment rack or wiring room are extremely important for proper system operation. Placing equipment too close together, inadequate ventilation, and inaccessible panels can make system maintenance difficult or cause system malfunctions and shutdowns.

When planning your site layout and equipment locations, remember the precautions described in the next section, “[Site Configuration](#),” to help avoid equipment failures and reduce the possibility of environmentally caused shutdowns. If you are currently experiencing shutdowns or unusually high errors with your existing equipment, these precautions may help you isolate the cause of the failures and prevent future problems.

Site Configuration

The following precautions will help you plan an acceptable operating environment for your router and help you avoid environmentally caused equipment failures:

- Ensure that the room in which you operate your system has adequate air circulation. Electrical equipment generates heat. Ambient air temperature might not be able to cool equipment to acceptable operating temperatures without adequate circulation.
- Always follow the ESD-prevention procedures described in the [“Preventing Electrostatic Discharge Damage” section on page 2-2](#) to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- Ensure that the chassis cover is secure. The chassis is designed to allow cooling air to flow effectively inside it. An open chassis allows air leaks, which might interrupt and redirect the flow of cooling air from internal components.

Equipment Racks

Cisco 2600 series routers with chassis height of 1 RU can be installed in 19-, 23-, and 24-inch racks.

Cisco 2600 series routers with chassis height of 2 RU can be installed in 19- or 23-inch racks.

The following information will help you plan your equipment rack configuration:

- Enclosed racks must have adequate ventilation. Ensure that the rack is not overly congested, because each unit generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air.
- When mounting a chassis in an open rack, ensure that the rack frame does not block the intake ports or the exhaust ports. If the chassis is installed on slides, check the position of the chassis when it is seated all the way into the rack.
- In an enclosed rack with a ventilation fan in the top, excessive heat generated by equipment near the bottom of the rack can be drawn upward and into the intake ports of the equipment above it in the rack. Ensure that you provide adequate ventilation for equipment at the bottom of the rack.
- Baffles can help to isolate exhaust air from intake air, which also helps to draw cooling air through the chassis. The best placement of the baffles depends on the airflow patterns in the rack, which can be found by experimenting with different arrangements.

Installation Checklist

The sample Installation Checklist lists items and procedures for installing a new router. Make a copy of this checklist and mark the entries when completed. Include a copy of the checklist for each router in your Site Log (described in the next section, [“Creating a Site Log”](#)).

Installation checklist for site_____

Router name_____

Task	Verified by	Date
Installation Checklist copied		
Background information placed in Site Log		
Site power voltages verified		
Installation site power check completed		
Required tools available		
Additional equipment available		
Router received		
The appropriate quick start guide for your router received		
<i>Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information</i> document received		
Product registration card received		
Cisco.com contact information label received		
Chassis components verified		
Initial electrical connections established		
ASCII terminal (for local configuration) or modem (for remote configuration)		
Signal distance limits verified		
Startup sequence steps completed		
Initial operation verified		
Software image verified		

Creating a Site Log

The Site Log provides a record of all actions related to the router. Keep it in an accessible place near the chassis where anyone who performs tasks has access to it. Use the Installation Checklist to verify steps in the installation and maintenance of the router. Site Log entries might include the following:

- Installation progress—Make a copy of the Installation Checklist and insert it into the Site Log. Make entries as each procedure is completed.
- Upgrade and maintenance procedures—Use the Site Log as a record of ongoing router maintenance and expansion history. A Site Log might include the following events:
 - Installation of network modules
 - Removal or replacement of network modules and other upgrades
 - Configuration changes

- Maintenance schedules and requirements
- Maintenance procedures performed
- Intermittent problems
- Comments and notes

Inspecting the Router

Do not unpack the router until you are ready to install it. If the final installation site will not be ready for some time, keep the chassis in its shipping container to prevent accidental damage. When you are ready to install the router, proceed with unpacking it.

The router, cables, publications, and any optional equipment you ordered may be shipped in more than one container. When you unpack the containers, check the packing list to ensure that you received all the following items:

- Router
- 6-foot (1.8-meter) power cord
- Rubber feet for desktop mounting (with routers of 1 rack-unit height only)
- Rack-mount brackets with screws for 19-inch rack (with all Cisco 2600 series routers)
- Rack-mount brackets with screws for 23-inch rack (with Cisco 2691 routers only)
- Grounding lug and bracket
- RJ-45-to-DB-9 adapter cable for console connection
- RJ-45-to-DB-25 adapter cable for modem connection
- Ethernet cable
- Optional equipment (such as network connection cables or additional rack-mount brackets)
- *Cisco 2600 Series Modular Routers Quick Start Guide*
- *Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information* document

Inspect all items for shipping damage. If anything appears to be damaged, or if you encounter problems installing or configuring your router, contact customer service. Warranty, service, and support information is in the quick start guide that shipped with your router.

Tools and Equipment for Installation and Maintenance

You need the following tools and equipment to install and upgrade the router and its components:

- ESD-preventive cord and wrist strap
- Number 2 Phillips screwdriver
- Flat-blade screwdrivers: small, 3/16-inch (4-5 mm) and medium, 1/4-inch (5-6 mm)
 - To install or remove modules
 - To remove the cover or mainboard tray, if you are upgrading memory or other components
- Rack-mount screws
- ROM 32-pin PLCC extractor tool

- Needlenose pliers
 - For straightening any pins bent when you install the ROM
- Cable ties, if required, for organizing cables

To install a Cisco 2600 router of 1 rack-unit height on a wall, you need suitable screws or wall anchors.

In addition, depending on the type of modules you plan to use, you might need the following equipment to connect a port to an external network:

- Cables for connection to the WAN and LAN ports (dependent on configuration).

**Note**

For more information on cable specifications, refer to the [Cisco Modular Access Router Cable Specifications](#) document online or on the Documentation CD-ROM.

- Ethernet hub or PC with a network interface card for connection to Ethernet (LAN) ports.
- Console terminal (an ASCII terminal or a PC running terminal emulation software) configured for 9600 baud, 8 data bits, no parity, and 1 stop bit.
- Modem for connection to the auxiliary port for remote administrative access (optional).
- Token Ring interfaces require a Token Ring media attachment unit (MAU).
- Serial interfaces may require a data service unit (DSU) or channel service unit/data service unit (DSU/CSU).
- CT1/PRI modules without the built-in CSU require an external CSU.
- ISDN BRI S/T interfaces require an NT1 device if one is not supplied by your service provider.

Console and Auxiliary Port Considerations

The router includes an asynchronous serial console port and an auxiliary port. The console and auxiliary ports provide access to the router either locally using a console terminal, or remotely using a modem connected to the auxiliary port. This section discusses important cabling information to consider before connecting a console terminal, which can be either an ASCII terminal or a PC running terminal emulation software, to the console port or modem to the auxiliary port.

The main difference between the console and auxiliary ports is that the auxiliary port supports hardware flow control and the console port does not. Flow control paces the transmission of data between a sending device and a receiving device. Flow control ensures that the receiving device can absorb the data sent to it before the sending device sends more. When the buffers on the receiving device are full, a message is sent to the sending device to suspend transmission until the data in the buffers has been processed. Because the auxiliary port supports flow control, it is ideally suited for use with the high-speed transmissions of a modem. Console terminals transmit at slower speeds than modems; therefore, the console port is ideally suited for use with console terminals.

Console Port Connections

The router has an EIA/TIA-232 asynchronous serial console port (RJ-45). Depending on the cable and the adapter used, this port appears as a DTE or DCE device at the end of the cable.

For connection to a PC running terminal emulation software, your router is provided with an RJ-45 to DB-9 adapter cable.

To connect the router to an ASCII terminal, use an RJ-45 rollover cable and an RJ-45-to-DB-25 female adapter (not provided).

The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 1 stop bit. The console port does not support hardware flow control. For detailed information about installing a console terminal, refer to the [“Connecting to a Console Terminal or Modem”](#) section on page 3-20.

For cable and port pinouts, refer to the [Cisco Modular Access Router Cable Specifications](#) document online or on the Documentation CD-ROM.

Auxiliary Port Connections

The router has an EIA/TIA-232 asynchronous serial auxiliary port (RJ-45) that supports flow control. Depending on the cable and the adapter used, this port appears as a DTE or DCE device at the end of the cable.

For connection to a modem, your router is provided with an RJ-45-to-DB-25 adapter cable.

For detailed information about connecting devices to the auxiliary port, refer to the [“Connecting to a Console Terminal or Modem”](#) section on page 3-20.

For cable and port pinouts, refer to the [Cisco Modular Access Router Cable Specifications](#) document online or on the Documentation CD-ROM.

Preparing to Connect to a Network

When setting up your router, consider distance limitations and potential electromagnetic interference (EMI) as defined by the applicable local and international regulations.

Network connection considerations are provided for several types of network interfaces and are described in the following sections:

- [Ethernet Connections, page 2-9](#)
- [Token Ring Connections, page 2-9](#)
- [Serial Connections, page 2-10](#)
- [ISDN BRI Connections, page 2-12](#)
- [56-K/Switched-56-kbps DSU/CSU Connections, page 2-13](#)

Refer to the following online documents for more information about network connections and interfaces:

- [Cisco Network Modules Hardware Installation Guide](#)
- [Cisco Interface Cards Installation Guide](#)
- [Cisco Modular Access Router Cable Specifications](#)



Warning

To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables. Statement 1021

Ethernet Connections

The IEEE has established Ethernet as standard IEEE 802.3. The most common Ethernet implementations are as follows:

- 100BASE-T—2-pair Category 5 or unshielded twisted-pair (UTP) straight-through RJ-45 cable.
- 10BASE-2—Ethernet on thin coaxial cable, also known as thin Ethernet. The maximum segment distance is 607 feet (186 meters).
- 10BASE-5—Ethernet on thick coaxial cable, also known as thick Ethernet. The maximum segment distance is 1,640 feet (500 meters).
- 10BASE-T—Ethernet on unshielded twisted-pair (UTP) cable. The maximum segment distance is 328 feet (100 meters). UTP cables look like the wiring used for ordinary telephones; however, UTP cables meet certain electrical standards that telephone cables do not meet.

[Table 2-2](#) lists the router models described in this guide and summarizes the LAN interfaces supported on each model.

Table 2-2 Cisco 2600 Series LAN Connections

Model	Ethernet (10BASE-T)	Token Ring (RJ-45)	Fast Ethernet (10/100)	Network Module Slot	WAN Interface Card Slots	Advanced Integration Module Slots
Cisco 2610	1	—	—	1	2	1
Cisco 2610XM	—	—	1	1	2	1
Cisco 2611	2	—	—	1	2	1
Cisco 2611XM	—	—	2	1	2	1
Cisco 2612	1	1	—	1	2	1
Cisco 2613	—	1	—	1	2	1
Cisco 2620	—	—	1	1	2	1
Cisco 2620XM	—	—	1	1	2	1
Cisco 2621	—	—	2	1	2	1
Cisco 2621XM	—	—	2	1	2	1
Cisco 2650	—	—	1	1	2	1
Cisco 2650XM	—	—	1	1	2	1
Cisco 2651	—	—	2	1	2	1
Cisco 2651XM	—	—	2	1	2	1
Cisco 2691	—	—	2	1	3	2

Token Ring Connections

The Cisco 2612 router provides both an Ethernet interface and a Token Ring shielded UTP interface. The Cisco 2613 router provides a single Token Ring interface. (See [Table 2-2](#).)

The IEEE has established Token Ring as standard IEEE 802.5. Specifications indicate a maximum segment distance of 328 feet (100 meters) for UTP cabling.

**Note**

To ensure agency compliance with FCC Class B electromagnetic emissions requirements (EMI), make sure that you use a shielded RJ-45 Token Ring cable when connecting your router to a Token Ring network.

Token Ring can operate at two different ring speeds: 4 and 16 Mbps. All devices on the Token Ring must use the same operating speed.

Use a Token Ring cable to connect the router to a switch. Refer to the section “Token Ring Port Pinouts” in the [Cisco Modular Access Router Cable Specifications](#) online document for the Token Ring port pinouts. This document is available online and on the Cisco Documentation CD-ROM.

Serial Connections

Serial connections are provided by WAN interface cards and network modules. The WAN interface cards can be installed in either slot of the 2-slot chassis; the network module can be installed in the Cisco 2600 series single network module slot. For more information on WAN interface cards, refer to the [Cisco Interface Cards Hardware Installation Guide](#). For more information on network modules, refer to the [Cisco Network Modules Hardware Installation Guide](#). These documents are accessible online and on the Cisco Documentation CD-ROM.

- For information about installing WAN interface cards, refer to the [Cisco Interface Cards Hardware Installation Guide](#).
- For information about installing network modules, refer to the [Cisco Network Modules Hardware Installation Guide](#).

Before you connect a device to a serial port, you need to know the following:

- Type of device, data terminal equipment (DTE) or data communications equipment (DCE), you are connecting to the synchronous serial interface
- Type of connector, male or female, required to connect to the device
- Signaling standard required by the device

Configuring Serial Connections

The serial ports on the asynchronous/synchronous serial network modules and the serial WAN interface card use DB-60 connectors. Serial ports can be configured as DTE or DCE, depending on the serial cable used.

Serial DTE or DCE Devices

A device that communicates over a synchronous serial interface is either a DTE or DCE device. A DCE device provides a clock signal that paces the communications between the device and the router. A DTE device does not provide a clock signal. DTE devices usually connect to DCE devices. The documentation that accompanied the device should indicate whether it is a DTE or DCE device. (Some devices have a jumper to select either DTE or DCE mode.) If you cannot determine the device type in the documentation, see [Table 2-3](#) to help you select the proper device type.

Table 2-3 Typical DTE and DCE Devices

Device Type	Gender	Typical Devices
DTE	Male ¹	Terminal PC
DCE	Female ²	Modem DSU/CSU Multiplexer

1. If pins protrude from the base of the connector, the connector is male.
2. If the connector has holes to accept pins, the connector is female.

Signaling Standards Supported

The synchronous serial ports available for the router support the following signaling standards: EIA/TIA-232, EIA/TIA-449, V.35, X.21, and EIA-530. You can order a Cisco DB-60 shielded serial transition cable that has the appropriate connector for the standard you specify. The documentation for the device you want to connect should indicate the standard used for that device. The router end of the shielded serial transition cable has a DB-60 connector, which connects to the DB-60 port on a serial WAN interface card. The other end of the serial transition cable is available with a connector appropriate for the standard you specify.

The synchronous serial port can be configured as DTE or DCE, depending on the attached cable (except EIA-530, which is DTE only). To order a shielded cable, contact customer service. See the [“Obtaining Documentation”](#) section on page xvii.



Note

All serial ports configured as DTE require external clocking from a DSU/CSU or other DCE device.

Although manufacturing your own serial cables is not recommended (because of the small size of the pins on the DB-60 serial connector), cable pinouts are provided in the [Cisco Modular Access Router Cable Specifications](#).

Distance Limitations

Serial signals can travel a limited distance at any given bit rate; generally, the slower the data rate, the greater the distance. All serial signals are subject to distance limits, beyond which a signal significantly degrades or is completely lost.



Note

Only the serial WAN interface card supports bit rates above 128 Kbps.

[Table 2-4](#) lists the recommended maximum speeds and distances for each serial interface type; however, you might get good results at speeds and distances greater than those listed, if you understand the electrical problems that might arise and can compensate for them. For instance, the recommended maximum rate for V.35 is 2 Mbps, but 4 Mbps is commonly used.

Table 2-4 Serial Signal Transmission Speeds and Distances

Rate (bps)	EIA/TIA-232 Distance		EIA/TIA-449, X.21, V.35, EIA-530 Distance	
	Feet	Meters	Feet	Meters
2400	200	60	4100	1250
4800	100	30	2050	625
9600	50	15	1025	312
19200	25	7.6	513	156
38400	12	3.7	256	78
56000	8.6	2.6	102	31
1544000 (T1)	—	—	50	15

Balanced drivers allow EIA/TIA-449 signals to travel greater distances than EIA/TIA-232 signals. The recommended distance limits for EIA/TIA-449 shown in [Table 2-4](#) are also valid for V.35, X.21, and EIA-530. Typically, EIA/TIA-449 and EIA-530 can support 2-Mbps rates, and V.35 can support 4-Mbps rates.

Asynchronous/Synchronous Serial Module Baud Rates

The following baud-rate limitations apply to the slow-speed serial interfaces found in the asynchronous/synchronous serial modules:

- Asynchronous interface—Maximum baud rate is 115.2 kbps.
- Synchronous interface—Maximum baud rate is 128-kbps full duplex.

ISDN BRI Connections

The BRI WAN interface cards provide Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) connections. The BRI modules and BRI WAN interface cards are available with either an S/T interface that requires an external Network Terminator 1 (NT1), or a U interface that has a built-in NT1.

You can install the BRI modules in any available slot in the chassis.



Warning

Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first. Statement 1026

Use a BRI cable (not included) to connect the BRI WAN interface card directly to an ISDN. [Table 2-5](#) lists the specifications for ISDN BRI cables. Also, refer to the [Cisco Modular Access Router Cable Specifications](#) online document for pinouts. This document is located on Cisco.com and the Documentation CD-ROM.

Table 2-5 ISDN-BRI Cable Specifications

Specification	High-Capacitance Cable	Low-Capacitance Cable
Resistance (at 96 kHz)	160 ohms/km	160 ohms/km
Capacitance (at 1 kHz)	120 nF ¹ /km	30 nF/km
Impedance (at 96 kHz)	75 ohms	150 ohms
Wire diameter	0.024 in. (0.6 mm)	0.024 in. (0.6 mm)
Distance limitation	32.8 ft (10 m)	32.8 ft (10 m)

1. nF = nanoFarad

For more information on BRI WAN interface cards, refer to the [Cisco Interface Cards Installation Guide](#) online document. This document is located on Cisco.com and the Documentation CD-ROM.

56-K/Switched-56-kbps DSU/CSU Connections

Switched-56-kbps connections are provided by the 56-kbps DSU/CSU WAN interface card.

For more information on Switched-56-kbps WAN interface cards, refer to the [Cisco Interface Cards Installation Guide](#) online document. This document is located on Cisco.com and the Documentation CD-ROM.



Installing the Router

This chapter guides you through the installation of Cisco 2600 series routers and includes the following sections:

- [Installing Modules, Interface Cards, and Power Supplies, page 3-2](#)
- [Setting Up the Chassis, page 3-3](#)
- [Installing the Chassis Ground Connection, page 3-13](#)
- [Power Connections, page 3-15](#)
- [Connecting WAN, LAN, and Voice Cables, page 3-18](#)
- [Connecting to a Console Terminal or Modem, page 3-20](#)
- [Powering Up the Router, page 3-23](#)
- [Configuring the Router, page 3-25](#)



Warning

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

Statement 1017



Warning

Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43



Warning

This equipment has been designed for connection to TN and IT power systems. Statement 1007



Warning

To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables. Statement 1021



Warning

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

**Warning**

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

Statement 1029

**Warning**

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

Statement 1030

**Warning**

To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit. Statement 1032

**Warning**

Ultimate disposal of this product should be handled according to all national laws and regulations.

Statement 1040

**Note**

See the [“Tools and Equipment for Installation and Maintenance”](#) section on page 2-6 for a list of tools and equipment that might be required for your installation.

Installing Modules, Interface Cards, and Power Supplies

Cisco routers are normally shipped with network modules, WAN interface cards (WICs), voice interface cards (VICs), advanced integration modules (AIMs), and power supplies already installed. If you need to remove or install any of these items, refer to the applicable documents online.

For network modules:

- [Quick Start Guide: Network Modules for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers](#)
- [Cisco Network Modules Installation Guide](#)

For WICs and VICs:

- [Quick Start Guide: Interface Cards for Cisco 1600, 1700, 2600, 3600, and 3700 Series](#)
- [Cisco Interface Cards Installation Guide](#)

For AIMs:

- [AIM Installation Quick Start Guide: Cisco 2600, 3600, and 3700 Series](#)
- [Installing Advanced Integration Modules in Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers](#)

For internal power supplies:

- [Cisco 2600 Series Power Supply Configuration Note](#)
- [Installing AC Power Supplies in Cisco 2691 Routers](#)

For external power supplies:

- [Cisco RPS Hardware Installation Guide](#)

**Note**

If there are modules, interface cards, or power supplies to be removed or installed, we recommend that you perform the installation or removal before you install the chassis. If a chassis cover must be removed, the chassis may have to be removed from the rack to permit cover removal.

If the required network modules, interface cards, and power supplies are already installed, proceed to the [“Setting Up the Chassis”](#) section on page 3-3.

Setting Up the Chassis

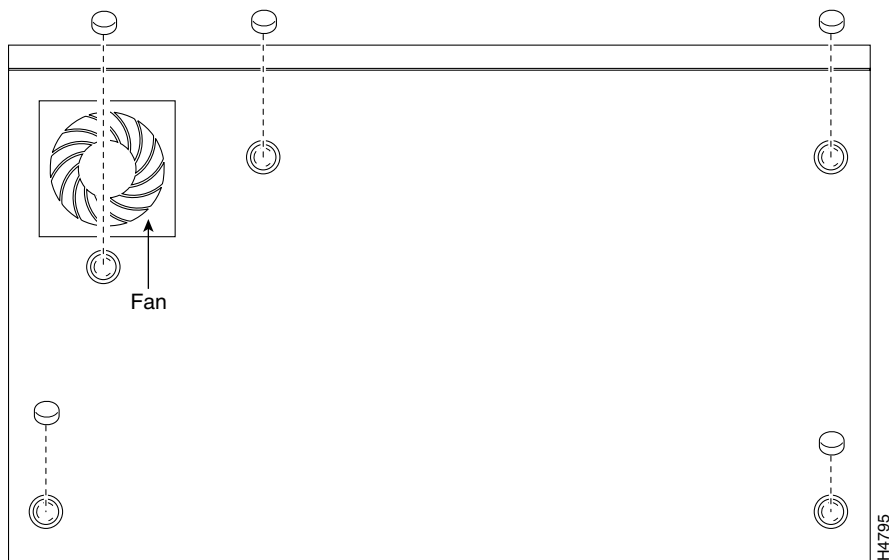
You can set the chassis on a desktop, install it in a rack, or mount it on a wall or other flat surface. Use the procedure in this section that best meets the needs of your network. The sections are as follows:

- [Setting the Chassis on a Desktop, page 3-3](#)
- [Mounting the Chassis in a Rack, page 3-4](#)
- [Mounting the Chassis on the Wall, page 3-11](#)

Setting the Chassis on a Desktop

You can place Cisco 2600 series routers on a desktop or shelf. For Cisco 2600 series routers of 1 rack-unit height only, attach the rubber feet supplied in the accessory kit. The procedure is as follows:

-
- Step 1** Place the router upside-down on a smooth, flat surface.
- Step 2** Peel the rubber feet from the black adhesive strip and attach them to the five round, recessed areas on the bottom of the chassis. (See [Figure 3-1](#).)

Figure 3-1 Rubber Feet Locations on Cisco 2600 Series Routers of 1-RU Height

Step 3 Place the router top-side up on a flat, smooth, secure surface.

**Caution**

Do not place anything on top of the router that weighs more than 10 pounds (4.5 kg). Excessive weight on top could damage the chassis.

After the router has been installed, you must connect the chassis to a reliable earth ground. For the chassis ground connection procedures, see the [“Installing the Chassis Ground Connection”](#) section on page 3-13.

Mounting the Chassis in a Rack

This section describes the procedures for rack-mounting the chassis. Cisco 2600 series routers with a chassis height of 1 rack-unit (1RU) ship with brackets for use with a 19-inch rack or, if specified in your order, optional larger brackets for use with a 23- or 24-inch rack. Cisco 2600 series routers with a chassis height of 2 rack-units (2RU) ship with brackets for use with 19-inch racks and with NEBS/ETSI-compliant brackets for use with 23-inch racks. The brackets are shown in [Figure 3-2](#), [Figure 3-3](#), and [Figure 3-4](#).

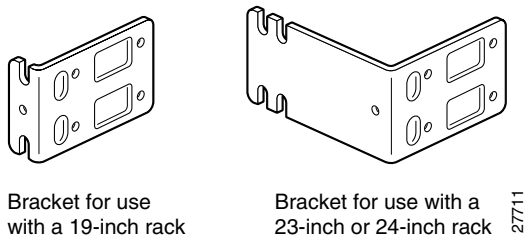
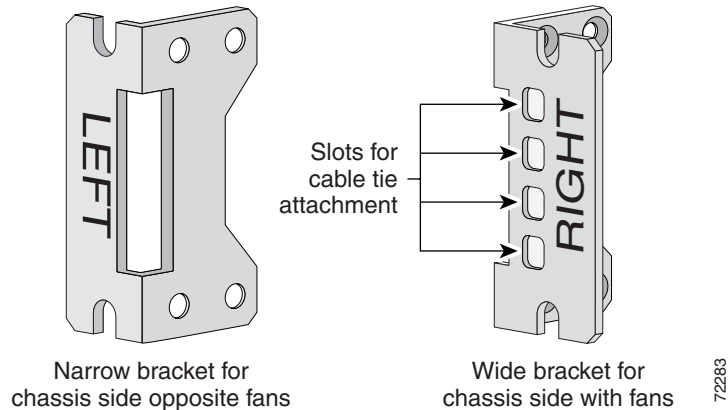
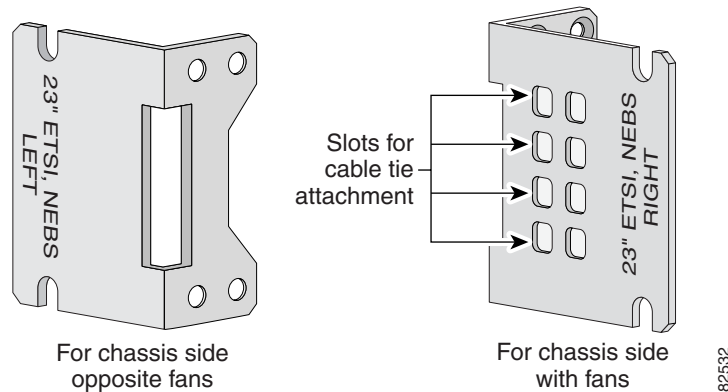
Figure 3-2 Brackets for Cisco 261x, Cisco 262x, Cisco 26xxXM, and Cisco 265x Series Routers

Figure 3-3 Brackets for 19-Inch Rack-Mounting of Routers with 2-RU Height**Figure 3-4 Brackets for 23-Inch Rack-Mounting of Routers with 2-RU Height**

Attaching the Brackets to Cisco 261x, Cisco 262x, Cisco 26xxXM, and Cisco 265x Series Routers

To install the chassis in a rack, attach the brackets in one of the following ways:

- With the front panel forward (see [Figure 3-5](#) and [Figure 3-6](#))
- With the rear panel forward (see [Figure 3-7](#) and [Figure 3-8](#))
- In a center-mount rack, with the rear panel forward (see [Figure 3-9](#) through [Figure 3-11](#))



Note

Use the screws that came with your router package for attaching the brackets.



Note

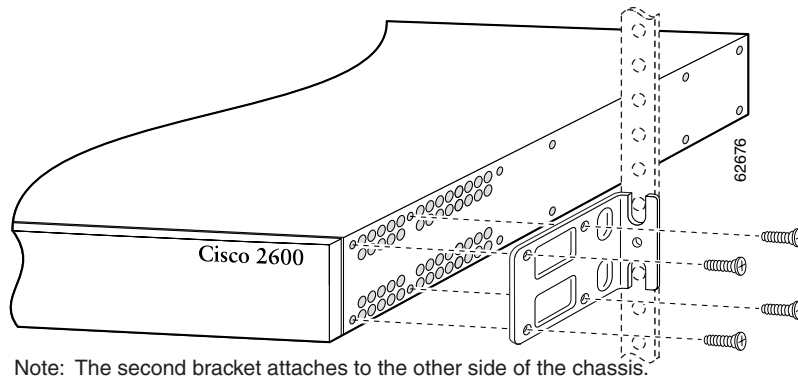
If you are installing a Cisco 2600 series router in a 19-inch rack with a 17.5-inch opening, orient the rack-mount brackets so that, when installed, they do not increase the width of the chassis. (See [Figure 3-5](#).)

If you are installing a Cisco 2600 series router in a 19-inch rack with a 17.75-inch opening or a 23- or 24-inch rack, orient the rack-mount brackets so that, when installed, they increase the width of the chassis. (See [Figure 3-6](#).)

**Note**

The following illustrations show how to connect the bracket to one side of the chassis. The second bracket connects to the opposite side of the chassis.

Figure 3-5 Bracket Installation—Front Panel Forward (19-Inch Rack with a 17.5-Inch Opening)

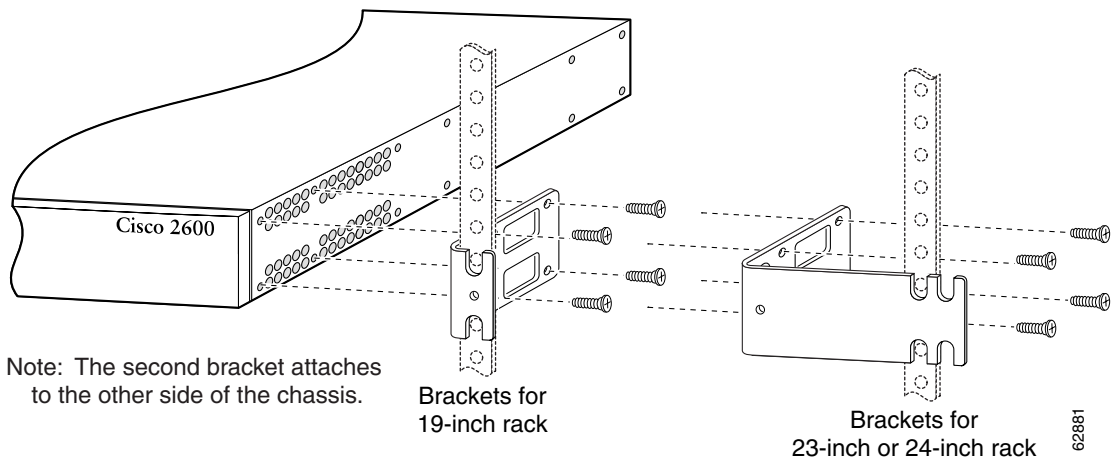


Note: The second bracket attaches to the other side of the chassis.

**Note**

When installed in a 19-inch rack with a 17.75-inch opening, Cisco 2600 series routers protrude beyond the front of the rack.

Figure 3-6 Bracket Installation—Front Panel Forward (19-Inch Rack with a 17.75-Inch Opening or a 23- or 24-Inch Rack)



Note: The second bracket attaches to the other side of the chassis.

Brackets for
19-inch rack

Brackets for
23-inch or 24-inch rack

62881

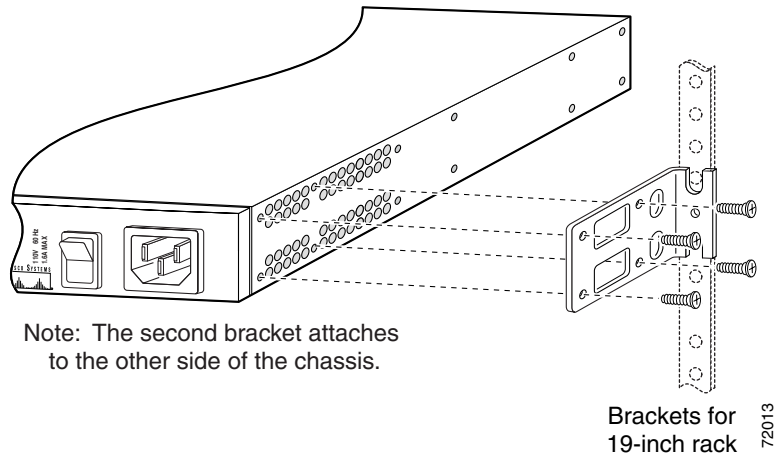
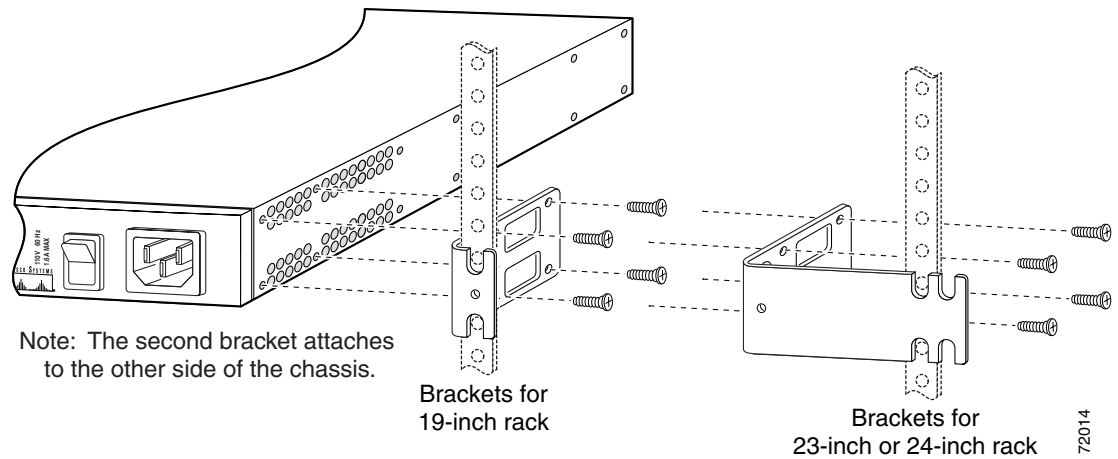
Figure 3-7 Bracket Installation—Rear Panel Forward (19-Inch Rack with a 17.5-Inch Opening)**Figure 3-8 Bracket Installation—Rear Panel Forward (19-Inch Rack with a 17.75-Inch Opening or a 23- or 24-Inch Rack)**

Figure 3-9 Center-Mount Bracket Installation—Rear Panel Forward (19-Inch Rack with a 17.75-Inch Opening or a 23- or 24-Inch Rack)

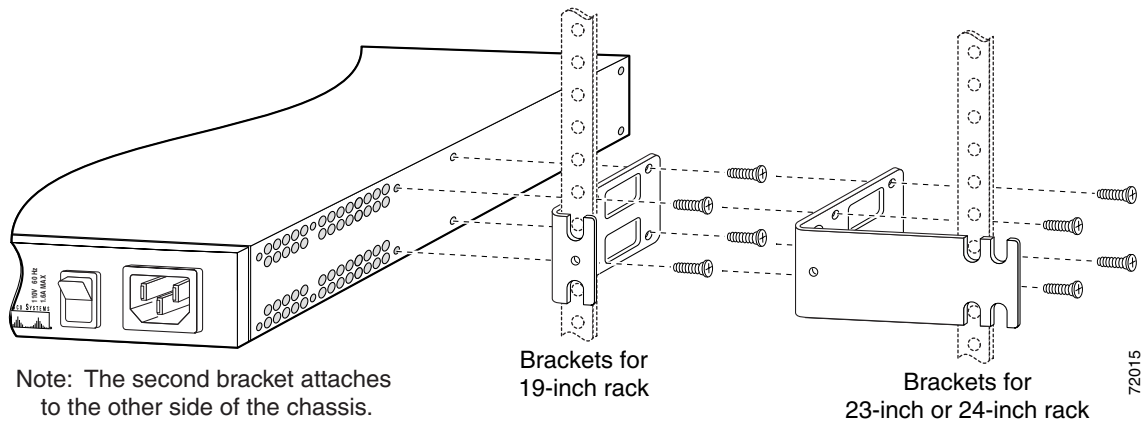


Figure 3-10 Center-Mount Bracket Installation—Rear Panel Forward (19-Inch Rack with a 17.5-Inch Opening or a 23- or 24-Inch Rack)

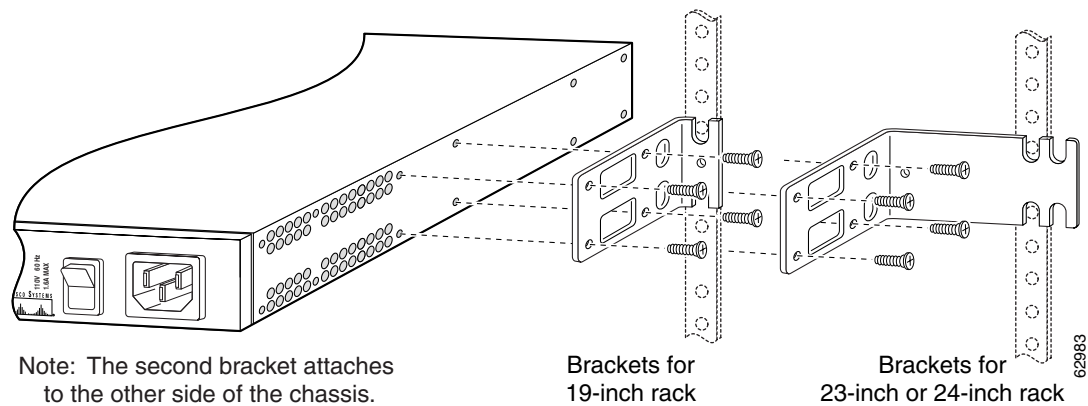
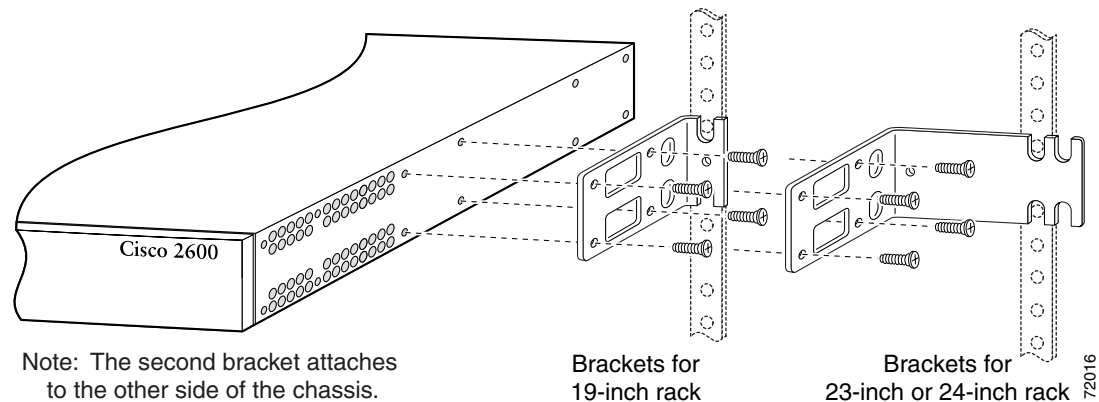


Figure 3-11 Center-Mount Bracket Installation—Front Panel Forward (19-Inch Rack with a 17.5-Inch Opening or a 23- or 24-Inch Rack)



Attaching the Brackets to a Router of 2-RU Height

To install the chassis in a rack, attach the brackets in one of the following ways:

- With the front panel forward (see [Figure 3-12](#))
- With the rear panel forward (see [Figure 3-13](#))
- In a center-mount rack (see [Figure 3-14](#) and [Figure 3-15](#))



Note

Use the screws that came with your router package for attaching the brackets.

Figure 3-12 Bracket Installation—Front Mounting

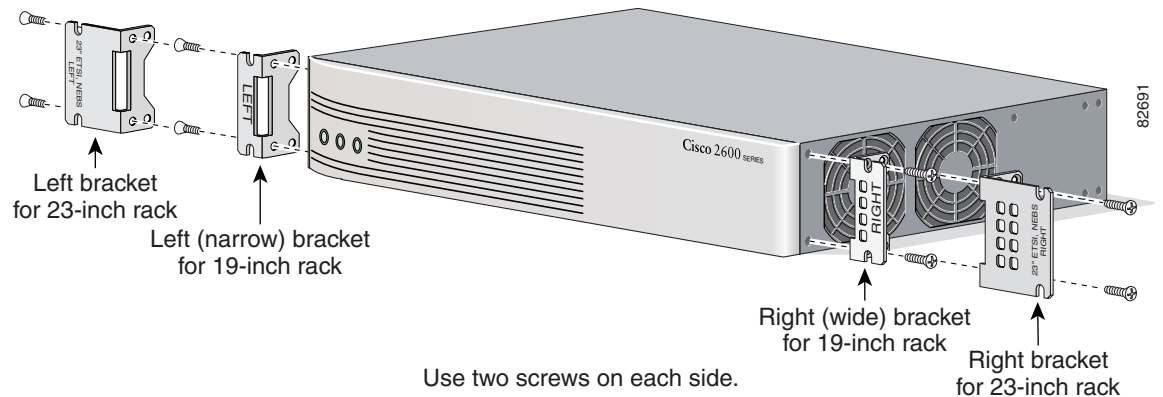


Figure 3-13 Bracket Installation—Rear Mounting

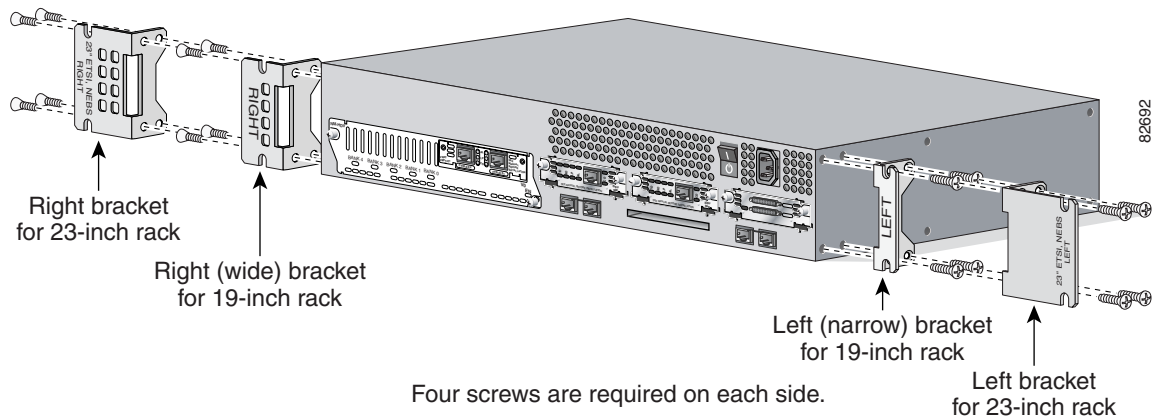
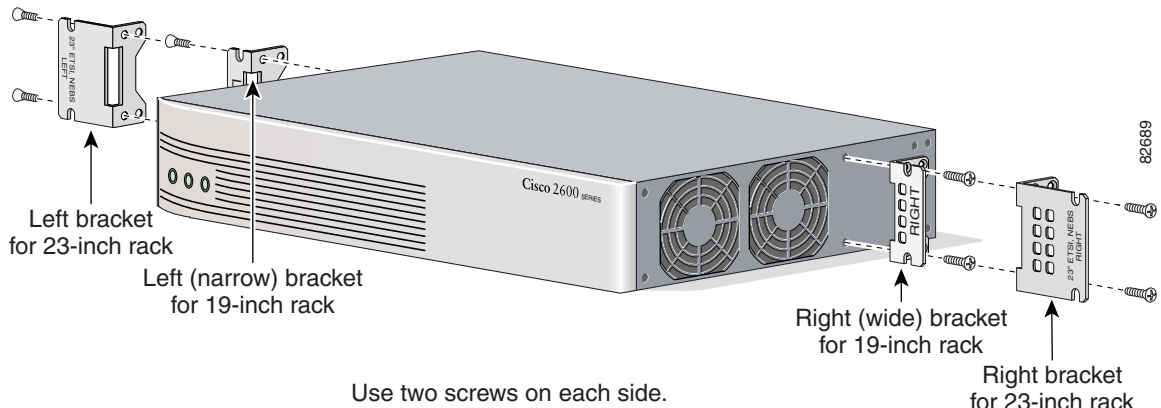
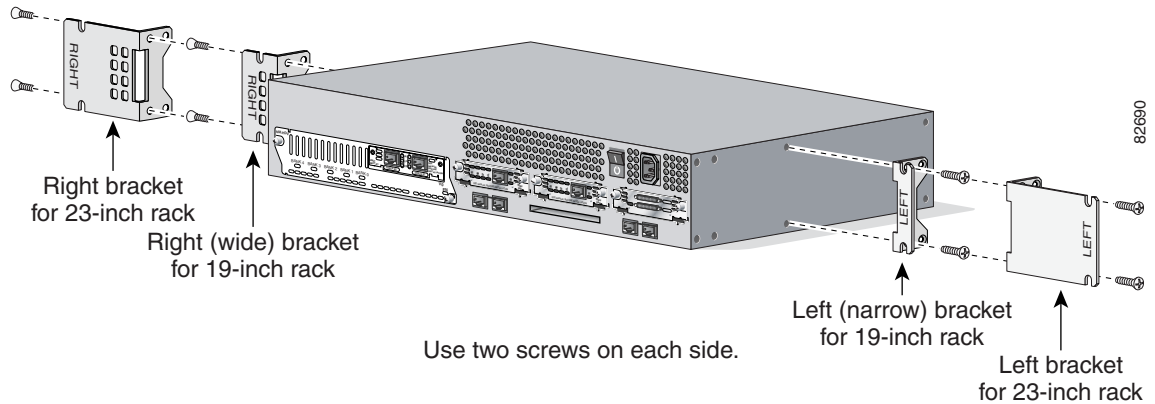


Figure 3-14 Bracket Installation—Center Mounting with Front Panel Forward**Figure 3-15 Bracket Installation—Center Mounting with Rear Panel Forward**

Installing the Router in a Rack

After the brackets are secured to the chassis, you can mount the chassis in a rack. Use the illustrations in the previous section as a guide to attaching the brackets to the rack.



Warning

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack. Statement 1006

To see translations of the warnings that appear in this publication, refer to the [Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Regulatory Compliance and Safety Information](#) document that accompanied this device.

**Note**

The screws for attaching the brackets to the rack are not included with the router.

**Caution**

Always use two screws to attach each bracket to the rack.

After the router has been installed, you must connect the chassis to a reliable earth ground. For the chassis ground connection procedures, see the [“Installing the Chassis Ground Connection”](#) section on page 3-13.

Mounting the Chassis on the Wall

This section explains how to mount Cisco 2600 series routers with a chassis height of 1RU on a wall. Mounting a 2-RU chassis to a wall is not recommended, and brackets are not provided for mounting to a wall.

**Tip**

When choosing a wall-mounting location, consider cable limitations and wall structure.

Use 19-inch brackets (shown in [Figure 3-2](#)) to wall-mount the chassis. The small brackets provide the most stable installation for the chassis. The rubber feet are required to provide spacing between the wall and the router for ventilation and proper cooling.

Attaching Rubber Feet to the Router

Attach the rubber feet supplied in the accessory kit. See [Figure 3-1 on page 3-4](#) for positioning the rubber feet.

Attaching Wall-Mount Brackets to the Router

To install the router on a wall, first attach the brackets on each side of the chassis as shown in [Figure 3-16](#), using plastic washers and slotted hex-head screws. Position the washers so that the narrow shoulder faces the router chassis.

**Note**

The hex-head screws and plastic washers are used only for wall-mounting the router. For rack-mounting, the brackets are attached using Phillips-head screws, without washers.

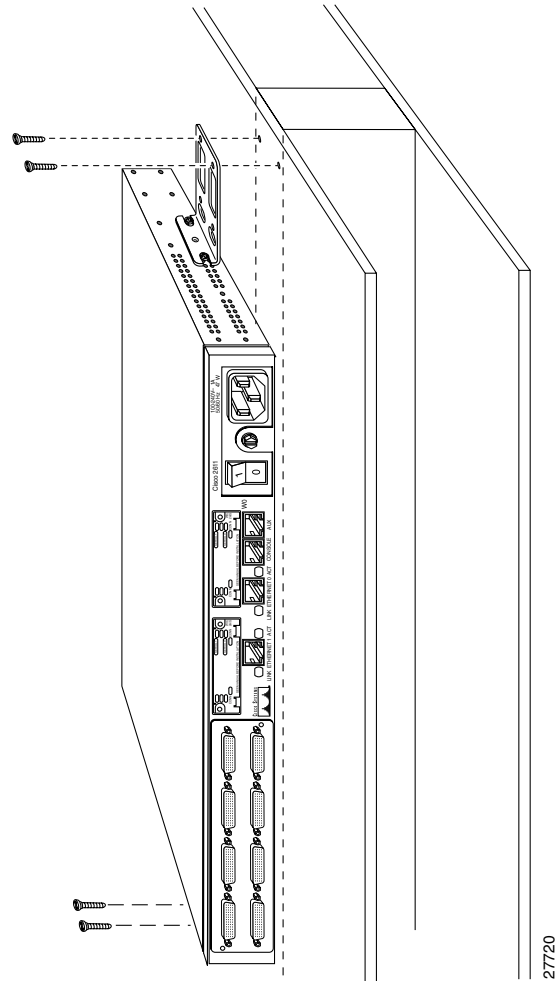
Figure 3-16 Attaching the Wall-Mount Brackets



Mounting the Router on the Wall

After fastening the brackets to the chassis, mount the chassis on the wall:

- Orient the front and rear of the chassis vertically.
- Position the end nearest the power cable at the top.
- Align the screws (not included) with a wall stud, or use wall anchors.
- [Figure 3-17](#) shows a typical wall-mounted installation.

Figure 3-17 Mounting the Chassis on the Wall

After the router has been installed, you must connect the chassis to a reliable earth ground. For the chassis ground connection procedures, see the [“Installing the Chassis Ground Connection”](#) section on page 3-13.

Installing the Chassis Ground Connection

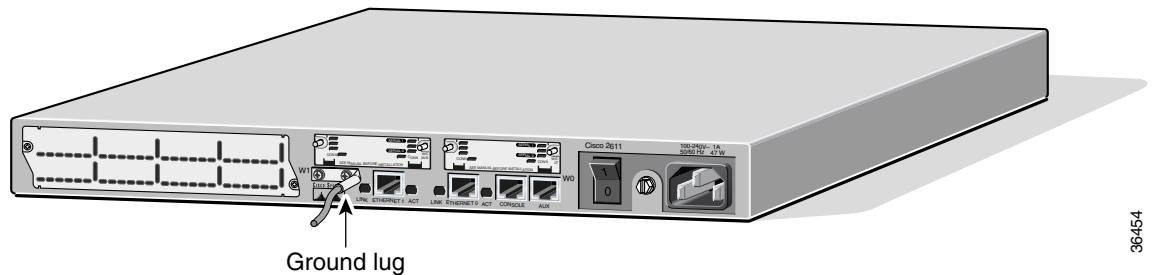
All Cisco 2600 series router chassis require a reliable earth ground connection. You must connect the chassis to a reliable earth ground; the ground wire must be installed in accordance with local electrical safety standards.

- For NEBS-compliant grounding, use size AWG 6 (13 mm²) wire and the ground lug provided in the accessory kit.
- For NEC-compliant grounding, use size AWG 14 (2 mm²) or larger wire and an appropriate user-supplied ring terminal.
- For EN/IEC 60950-compliant grounding, use size AWG 18 (1 mm²) or larger wire and an appropriate user-supplied ring terminal.

To connect the chassis to a reliable earth ground, perform the following steps:

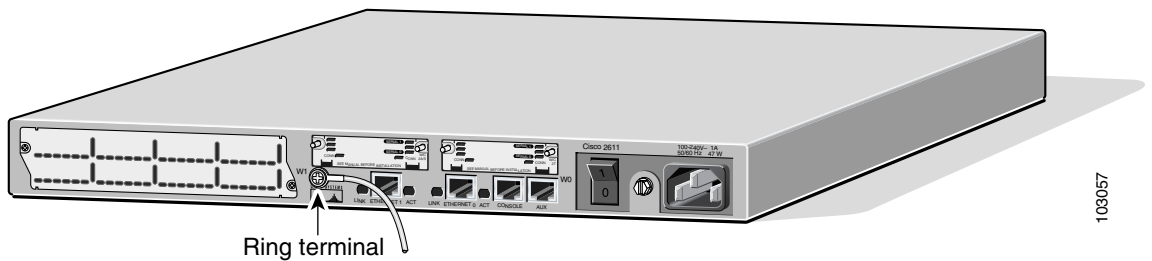
- Step 1** Strip one end of the ground wire to the length required for the ground lug or terminal.
 - For the NEBS ground lug—approximately 0.75 in. (20 mm)
 - For user-provided ring terminal—as required
- Step 2** Crimp the ground wire to the ground lug or ring terminal, using a crimp tool of the appropriate size.
- Step 3** Attach the ground lug or ring terminal to the chassis as shown in [Figure 3-18](#), [Figure 3-19](#), [Figure 3-20](#), or [Figure 3-21](#). For the ground lug, use the two screws with captive locking washers provided. For a ring terminal, use one of the screws provided. Use a number 2 Phillips screwdriver, and tighten the screws to a torque of 8 to 10 in-lb (0.9 to 1.1 N-m).
- Step 4** Connect the other end of the ground wire to a suitable grounding point at your site.

Figure 3-18 NEBS-Compliant Chassis Ground Connection Using Ground Lug, 1-RU Chassis



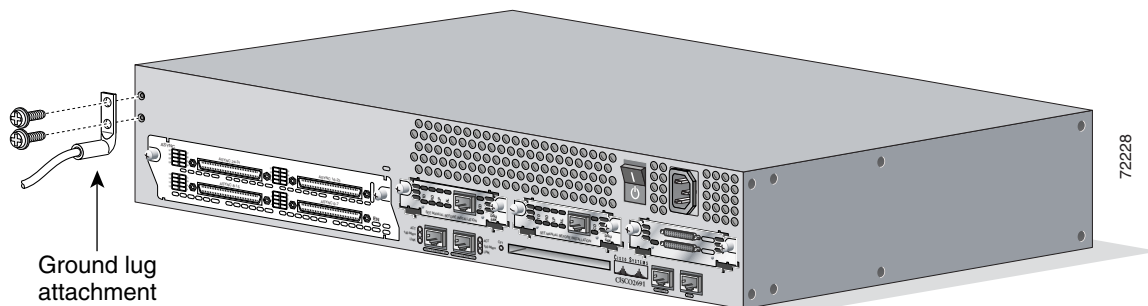
36454

Figure 3-19 Chassis Ground Connection Using Ring Terminal, 1-RU Chassis

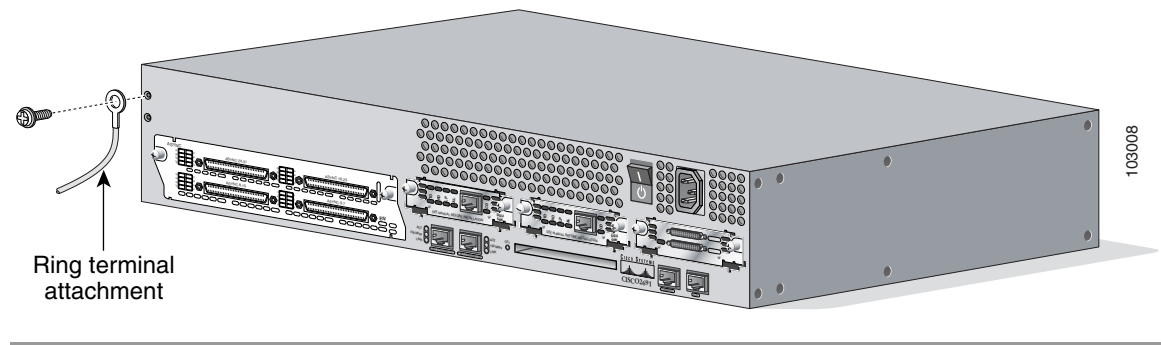


103057

Figure 3-20 NEBS-Compliant Chassis Ground Connection Using Ground Lug, Cisco 2691



72228

Figure 3-21 Ground Connection Using Ring Terminal, Cisco 2691

After the router has been installed and properly grounded, you can connect the power wiring; the WAN, LAN, and voice cables; and the cables for administrative access, as required for your installation. For cable connection procedures, see the [“Power Connections”](#) section on page 3-15, the [“Connecting WAN, LAN, and Voice Cables”](#) section on page 3-18, and the [“Connecting to a Console Terminal or Modem”](#) section on page 3-20.

Power Connections



Warning

Read the installation instructions before connecting the system to the power source. Statement 1004



Warning

Do not work on the system, or connect or disconnect cables during periods of lightning activity. Statement 1001



Note

The installation must comply with all required electrical codes applicable at the installation site.

This section explains how to connect AC or DC power to Cisco 2600 series routers. It covers the following topics:

- [Connecting Routers to AC Power, page 3-15](#)
- [Connecting Routers to a DC-Input Power Supply, page 3-16](#)
- [Connecting Routers to the Cisco Redundant Power System, page 3-18](#)

Connecting Routers to AC Power

If your router uses AC power, connect it to a 15 A, 120 VAC (10 A, 240 VAC) circuit with overcurrent protection.



Note

The input voltage tolerance limits for AC power are 85 and 264 VAC.

**Warning**

AC connected units must have a permanent ground connection in addition to the power cable ground wire. NEBS-compliant grounding satisfies this requirement. Statement 284

**Warning**

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 15A, 120VAC (10A, 240VAC). Statement 1005

Connecting Routers to a DC-Input Power Supply

If your router has a DC-input power supply, follow the directions in this section for proper wiring.

**Warning**

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 15A, 60VDC. Statement 1005

**Warning**

Use copper conductors only. Statement 1025

DC Wiring Requirements

Table 3-1 summarizes the wiring requirements for Cisco 2600 series routers with a DC-input power supply.

**Note**

For installations compliant with the National Electric Code, AWG 14 (2.0 mm²) wire is required for DC input and safety ground wire.

Table 3-1 DC Wiring Requirements for Cisco 2600 Series Routers

Router	DC Input	DC Input Wire Size ¹	Safety Ground Wire Size	Overcurrent Protection
Cisco 2600 with 1-RU chassis height	–48 to –60 VDC, 4 A ²	AWG 18 (1.0 mm ²)	AWG 14 (2.0 mm ²)	15 A maximum
Cisco 2691	24 - 36 V, 8 A, positive or negative, single or dual sources ³	AWG 18 (1.0 mm ²)	AWG 14 (2.0 mm ²)	15 A maximum
	36 - 60 V, 4 A, positive or negative, single or dual sources	AWG 18 (1.0 mm ²)	AWG 14 (2.0 mm ²)	15 A maximum

1. See the note above this table for National Electric Code wire size requirements.
2. The input voltage tolerance limits for nominal 48-V power supplies are 38 and 72 VDC.
3. The input voltage tolerance limits for nominal 24/48-V power supplies are 18 and 72 VDC.

Wiring Procedure for DC Input

To connect the router to a DC power source, perform this procedure:

- Step 1** Remove power from the DC circuit. To ensure that power is removed from the DC circuit, locate the circuit breaker for the DC circuit, switch the circuit breaker to the OFF position, and tape the circuit-breaker switch in the OFF position.



Warning

Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003



Tip

Secure all power cabling when installing this unit to avoid disturbing field-wiring connections.

- Step 2** Strip the wires to the appropriate length for the terminal block on the power supply.

- Step 3** Connect the DC power input wires to the terminal block, as shown in [Figure 3-22](#).



Warning

The illustration shows the DC power supply terminal block. Wire the DC power supply as illustrated. The proper wiring sequence is ground to ground, positive to positive, and negative to negative. The ground wire should always be connected first and disconnected last. Statement 239



Caution

The terminal arrangement on your router may not be identical to the arrangement shown in the figures. You must connect the positive, negative, and ground wires according to the labels on the terminals.



Caution

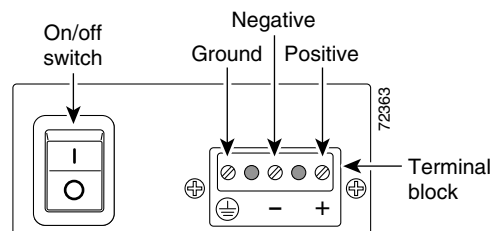
Do not overtorque the terminal block captive thumbscrew or terminal block contact screws. The recommended torque is 8.0 ± 0.5 inch-lb (0.93 ± 0.05 N-m).



Note

The 2600XM DC power supply is reverse connection protected. There are no negative effects if input power leads are connected backwards except that the router will not boot up.

Figure 3-22 DC Power Connections for Cisco 2600 Series Routers (Typical)



- Step 4** Secure the wires using cable ties.

- Step 5** Turn on power to the DC circuit.

Connecting Routers to the Cisco Redundant Power System

If your router uses the Cisco Redundant Power System (RPS), refer to the [Cisco RPS Hardware Installation Guide](#) for instructions about the power connections. You can access this document at the location described in the “[Obtaining Documentation](#)” section on page xvii.

Connecting WAN, LAN, and Voice Cables

This chapter describes how to connect the WAN, LAN, and voice interface cables. It includes the following sections:

- “[Ports and Cabling](#)” section on page 3-18
- “[LAN, WAN, and Voice Connection Procedures](#)” section on page 3-19

**Note**

One or two Ethernet cables are typically provided with the router. Additional cables and transceivers can be ordered from Cisco. For ordering information, refer to the [Cisco Product Catalog](#) at http://www.cisco.com/en/US/products/products_catalog_links_launch.html. For cable pinouts, refer to the [Cisco Modular Access Router Cable Specifications](#) document available online and on the Documentation CD-ROM.

**Warning**

Do not work on the system, or connect or disconnect cables during periods of lightning activity.
Statement 1001

Ports and Cabling

[Table 3-2](#) summarizes some typical WAN, LAN, and voice connections for Cisco 2600 series routers.

The connections summarized here are also described in detail in the following documents:

- [Cisco Modular Access Router Cable Specifications](#)
- [Cisco Network Modules Installation Guide](#)
- [Cisco Interface Cards Installation Guide](#)

Table 3-2 WAN, LAN, and Voice Connections

Port or Connection	Port Type, Color	Connected To:	Cable
Ethernet	RJ-45, yellow	Ethernet hub or Ethernet switch	Straight-through Ethernet
T1/E1 WAN	RJ-48C/CA81A, blue	T1 or E1 network	RJ-48 T1
Cisco serial	60-pin D-sub	CSU/DSU and serial network or equipment	Cisco serial transition cable that matches the signaling protocol (EIA/TIA-232, EIA/TIA-449, V.35, X.21, or EIA/TIA-530) and the serial port operating mode (DTE or DCE). ¹
Cisco Smart serial	Cisco Smart compact connector, blue	CSU/DSU and serial network or equipment (For WIC-2T and WIC-2A/S only)	
DSL	RJ-11C/CA11A, lavender	Network demarcation device for service provider's DSL interface	RJ-11

Table 3-2 WAN, LAN, and Voice Connections (continued)

Port or Connection	Port Type, Color	Connected To:	Cable
T1 digital voice	RJ-48C/CA81A, tan	Digital PBX	RJ-48 T1 cable
Analog voice FXS	RJ-11, gray	Telephone, fax	RJ-11
Analog voice FXO	RJ-11, pink	Central office, analog PBX	RJ-11
Analog voice E&M	RJ-11, brown	Analog PBX	RJ-11
BRI S/T WAN (external NT1)	RJ-48C/CA81A, orange	NT1 device or private integrated network exchange (PINX)	RJ-48
BRI U WAN (built-in NT1)	RJ-49C/CA11A, red	ISDN network	RJ-49
CT1/PRI	T1	External T1 CSU	DB-15 T1 serial cable
CT1/PRI-CSU	T1	RJ-48C/CA81A interface	RJ-48 straight-through
CE1/PRI	E1	E1 network	DB-15 to BNC, DB-15 to DB-15, DB-15 to twinax, or DB-15 to RJ-45
Token Ring	UTP, purple STP, purple	Token Ring device	RJ-45 Token Ring cable
56/64-kbps DSU/CSU	8-pin modular, blue	RJ-48S interface	RJ-48 straight-through

1. Refer to the [Cisco Modular Access Router Cable Specifications](#) for information about selecting these cables.

LAN, WAN, and Voice Connection Procedures

Connect each WAN, LAN, and voice cable to the appropriate connector on the chassis or on a network module or interface card.

- Position the cables carefully, so that they do not put strain on the connectors.
- Organize cables in bundles such that cables do not intertwine.
- Inspect the cables to make sure that the routing and bend radiuses are satisfactory. Reposition cables, if necessary.
- Install cable ties in accordance with site requirements.

For cable pinouts, refer to the online document [Cisco Modular Access Router Cable Specifications](#).

For more information about connecting and configuring network modules, WAN interface cards, and voice interface cards, refer to the following documents:

- [Cisco Network Modules Installation Guide](#)
- [Cisco Interface Cards Installation Guide](#)

Connecting to a Console Terminal or Modem

Your router includes asynchronous serial console and auxiliary ports. These ports provide administrative access to your router either locally (with a console terminal) or remotely (with a modem).

Cisco provides the following cables and adapters for connecting your router to a console terminal, PC, or modem:

- One console adapter cable (RJ-45-to-DB-9, blue)
- One modem adapter cable (RJ-45-to-DB-25, black)

This section describes how to connect a console terminal or PC to the console port, and how to connect a modem to the auxiliary port. It contains the following sections:

- [Connecting to the Console Port, page 3-20](#)
- [Connecting to the Auxiliary Port, page 3-21](#)
- [Identifying a Rollover Cable, page 3-22](#)



Note

For information on identifying rollover cables, refer to the [“Identifying a Rollover Cable” section on page 3-22](#).

Connecting to the Console Port

To connect a console terminal or a PC running terminal emulation software to the console port on the router, perform the following procedure:

- Step 1** Connect the terminal using the blue RJ-45-to-DB-9 adapter cable. (See [Figure 3-23](#).)

For information about console port pinouts, refer to the [Cisco Modular Access Router Cable Specifications](#) document available online and on the Documentation CD-ROM.



Note

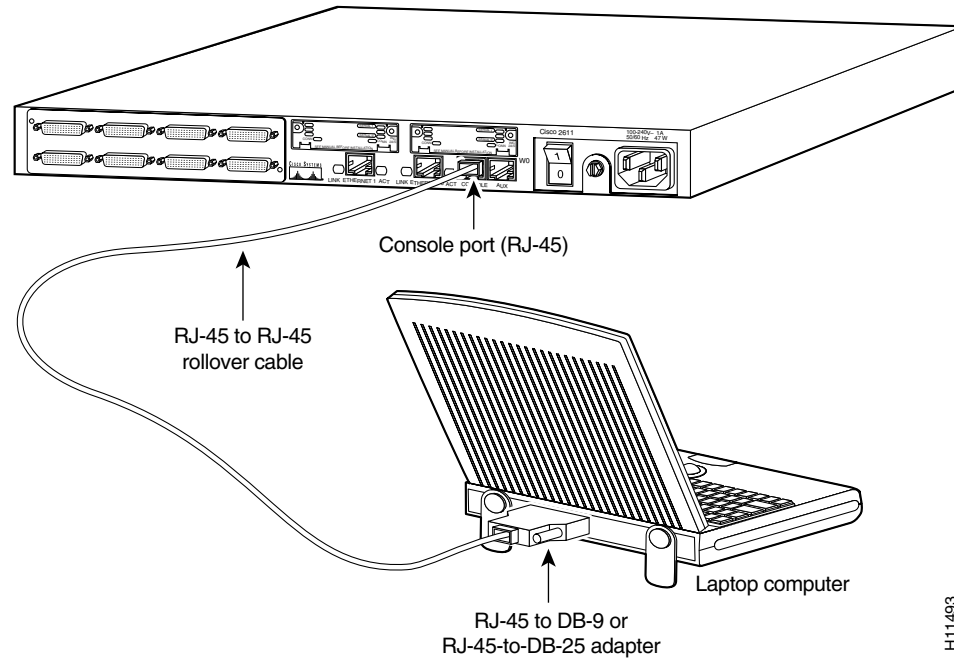
On the Cisco routers, the console port is color-coded blue.

- Step 2** Configure your terminal or PC terminal emulation software for 9600 baud, 8 data bits, no parity, and 1 stop bit.



Note

Because hardware flow control is not possible on the console port, we do not recommend that modems be connected to the console port. Modems should be connected only to the auxiliary port.

Figure 3-23 Connecting to a Console Terminal

H11493

Connecting to the Auxiliary Port

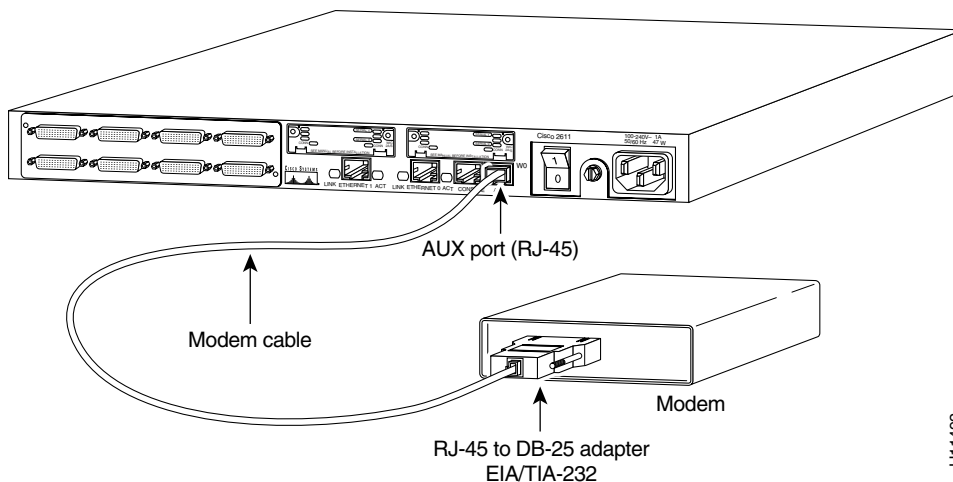
To connect a modem to the auxiliary port on the router, perform the following procedure:

- Step 1** Connect a modem to the auxiliary port using the black RJ-45-to-DB-25 adapter cable. (See [Figure 3-24](#).) For information about auxiliary port pinouts, refer to the [Cisco Modular Access Router Cable Specifications](#) document available online and on the Documentation CD-ROM.



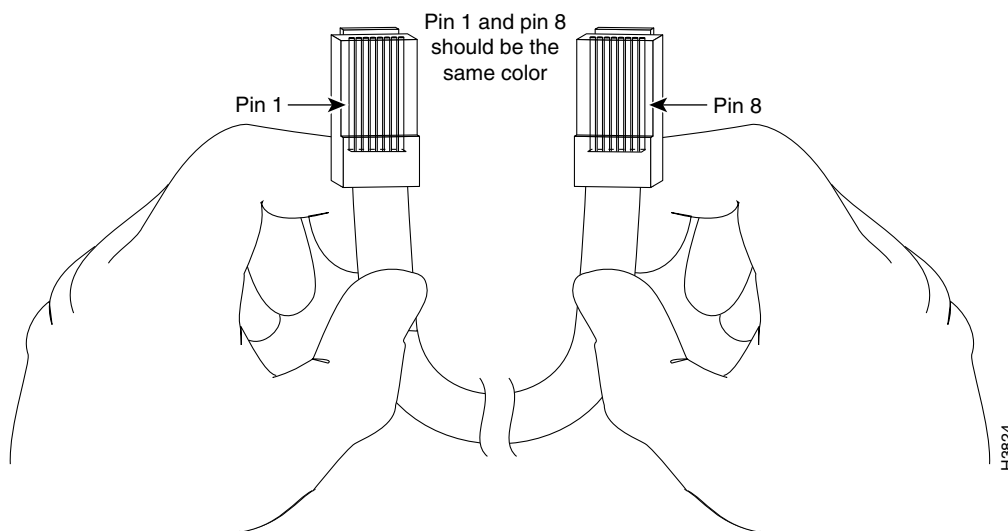
Note On the Cisco routers, the auxiliary port is color-coded black.

- Step 2** Make sure that your modem and the auxiliary port on the router are configured for the same transmission speed (up to 115200 bps is supported) and hardware flow control with Data Carrier Detect (DCD) and Data Terminal Ready (DTR) operations.

Figure 3-24 Connecting a Modem to the Auxiliary Port

Identifying a Rollover Cable

Use a rollover cable to connect to the asynchronous serial console and auxiliary ports. You can identify a rollover cable by comparing the two modular ends of the cable. Hold the cables side-by-side, with the tab at the back. The wire connected to the pin on the outside of the left plug should be the same color as the wire connected to the pin on the outside of the right plug. (See [Figure 3-25](#).) If your cable came from Cisco, pin 1 will be white on one connector, and pin 8 will be white on the other (a rollover cable reverses pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5).

Figure 3-25 Identifying a Rollover Cable

Powering Up the Router

**Warning**

The plug-socket combination must be accessible at all times because it serves as the main disconnecting device. Statement 1019

**Caution**

To ensure adequate cooling, never operate the router unless the unit is completely closed.

This section covers the following topics:

- [Checklist for Power Up, page 3-23](#)
- [Front Panel Indicators, page 3-23](#)
- [Power-Up Procedure, page 3-24](#)

Checklist for Power Up

You are ready to power up the Cisco router if the following steps are completed:

- Chassis is securely mounted.
- Power and interface cables are connected.
- Your PC terminal emulation program is configured for 9600 baud, 8 data bits, 1 stop bit, and no parity.
- You have selected passwords for access control.
- You have determined the IP addresses for the Ethernet and serial interfaces.

Front Panel Indicators

The following indicator LEDs provide power, activity, and status information:

Routers with 1-RU Chassis Height

The following indicator LEDs provide power, activity, and status information:

- POWER (green)—Lit when power is on.
- RPS (green)—
 - Off—No redundant power supply (RPS) is present
 - Blinking —System is booted, RPS is present, RPS failure
 - Continuous on—System is booted, RPS is present, no RPS failure
- ACTIVITY (green)—
 - Slow, steady blinking—System is booting
 - Blinks during system activity, such as interrupts and packet transfers

Routers with 2-RU Chassis Height

The following indicator LEDs provide power, activity, and status information:

- PWR (green)—Lit when power is on.
- SYS/RPS (green)—
 - Rapid blinking (200 ms)—System is booting
 - Slow blinking (1 s)—Redundant power supply (RPS) failure
 - Continuous on—System okay
- ACT (green)—Blinks during system activity, such as interrupts and packet transfers

For more detailed information about the LEDs, see [Appendix A, “Troubleshooting.”](#)

Power-Up Procedure

To power up your Cisco router and verify that it goes through its initialization and self-test, follow this procedure. When the procedure is finished, the Cisco router is ready to configure.

If you encounter problems when you power on the router, see [Appendix A, “Troubleshooting.”](#) For information about the ROM monitor and the bootstrap program, see [Appendix B, “Using the ROM Monitor.”](#) For information about the configuration register, see [Appendix C, “Configuration Register.”](#)



Note

To view the boot sequence through a terminal session, you must have a console connection to the Cisco router *before* it powers up.

Step 1 Make sure that your PC is powered up and connected as described in the [“Checklist for Power Up” section on page 3-23.](#)

Step 2 Move the power switch to the ON position.

The following indications appear:

- The green POWER or PWR LED on the front of the chassis comes on.
- The fan operates.

Depending on your installation, Fast Ethernet (0/0, 0/1) and Network Module (Active, Ready) LEDs might also come on.

If you encounter problems when you power up the router, see [Appendix A, “Troubleshooting.”](#)

Messages begin to appear in your terminal emulation program window.



Caution

Do not press any keys on the keyboard until the messages stop. Any keys pressed during this time are interpreted as the first command typed when the messages stop, which might cause the router to power off and start over. It takes a few minutes for the messages to stop.

You may see different startup messages:

- If you see the following messages, the router has booted with a configuration file and is ready for initial configuration using Cisco Router and Security Device Manager (SDM).

```
yourname con0 is now available
```

```
Press RETURN to get started.
```

If SDM is installed on your router, we recommend using SDM to perform the initial configuration. For configuration procedures using SDM, refer to the quick start guide that shipped with your router.

You can also access the [Cisco 2600 series routers quick start guides](http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis2600/26xx_qsg/index.htm) online at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis2600/26xx_qsg/index.htm

- If you see the following messages, the router has booted and is ready for initial configuration using the setup command facility or the command-line interface (CLI).

```
--- System Configuration Dialog ---
```

```
At any point you may enter a question mark '?' for help.  
Use ctrl-c to abort configuration dialog at any prompt.  
Default settings are in square brackets '[]'.
```

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

To learn how to use the setup command facility to configure the router, see the “[Initial Configuration Using the Setup Command Facility](#)” section on page 3-26. To learn how to use the CLI to configure the router, see the “[Initial Configuration Using the CLI \(Manual Configuration\)](#)” section on page 3-28.

**Note**

If the `rommon 1>` prompt appears, your system has booted in ROM monitor mode. For information on the ROM monitor, see the router rebooting and ROM monitor information in the [Cisco IOS Configuration Fundamentals Configuration Guide](#) for your Cisco IOS software release.

Configuring the Router

You can configure your router by using one of the following tools:

- Cisco Router and Security Device Manager. If your router was purchased with a virtual private network (VPN) bundle, Cisco Router and Security Device Manager is installed on the router. See the “[Initial Configuration Using SDM](#)” section on page 3-26
- Setup command facility. you can use the setup command facility to prompt you for basic router information. After the configuration file has been created, you can use the CLI or use Cisco Router and Security Device Manager to perform additional configuration. See the “[Initial Configuration Using the Setup Command Facility](#)” section on page 3-26.
- Command-line interface (CLI). If you prefer to use the Cisco IOS CLI, see the “[Initial Configuration Using the CLI \(Manual Configuration\)](#)” section on page 3-28 for instructions on how to use the CLI.

**Note**

If you need help with interface and port numbering, see the “[Interface Numbering](#)” section on page 1-9.

Initial Configuration Using SDM

If Cisco Router and Security Device Manager has been installed on your router, the following messages appear at the end of the startup sequence:

```
yourname con0 is now available
```

```
Press RETURN to get started.
```

For configuration procedures using SDM, refer to the quick start guide that shipped with your router.

You can also access the [Cisco 2600 series routers quick start guides](http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis2600/26xx_qsg/index.htm) online at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis2600/26xx_qsg/index.htm

Initial Configuration Using the Setup Command Facility

This section shows how to use the setup command facility to configure a hostname for the router, set passwords, and configure an interface for communication with the management network. If you see the following messages at the end of the startup sequence, the setup command facility has been invoked automatically:

```
--- System Configuration Dialog ---
```

```
At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.
```

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

The setup command facility prompts you for basic information about your router and network, and it creates an initial configuration file. The prompts vary, depending on your router model, the installed interface modules, and the software image. The following example and the user entries (in **bold**) are shown as examples only.

For a description of the interface numbering, see the [“Interface Numbering” section on page 1-9](#).



Note

If you make a mistake while using the setup command facility, you can exit and run the setup command facility again. Press **Ctrl-C**, and enter **setup** at the privileged EXEC mode prompt (Router#).

Step 1 To proceed using the setup command facility, enter **yes** when the power-up messages have ended.

```
Would you like to enter the initial configuration dialog? [yes/no]: yes
```

Step 2 When the following messages appear, press **Return** to enter basic management setup:

```
At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.
```

```
Basic management setup configures only enough connectivity
for management of the system, extended setup will ask you
to configure each interface on the system
```

```
Would you like to enter basic management setup? [yes/no]: yes
```


Step 3 Enter a hostname for the router (this example uses **2600**):

Configuring global parameters:

Enter hostname [Router]: **2600**

Step 4 Enter an enable secret password. This password is encrypted (more secure) and cannot be seen when viewing the configuration:

The enable secret is a password used to protect access to privileged EXEC and configuration modes. This password, after entered, becomes encrypted in the configuration.

Enter enable secret: **xxxxxx**

Step 5 Enter an enable password that is different from the enable secret password. This password is *not* encrypted (less secure) and can be seen when viewing the configuration:

The enable password is used when you do not specify an enable secret password, with some older software versions, and some boot images.

Enter enable password: **xxxxxx**

Step 6 Enter the virtual terminal password, which prevents unauthenticated access to the router through ports other than the console port:

The virtual terminal password is used to protect access to the router over a network interface.

Enter virtual terminal password: **xxxxxx**

Step 7 Respond to the following prompts as appropriate for your network:

Configure SNMP Network Management? [yes]:
Community string [public]:

Step 8 A summary of the available interfaces is displayed:**Note**

The interface numbering that appears is dependent on the type of Cisco modular router platform and on the installed interface modules and cards.

Current interface summary

Controller	Timeslots	D-Channel	Configurable modes	Status
T1 0/0	24	23	pri/channelized	Administratively up

Interface	IP-Address	OK?	Method	Status	Pro
FastEthernet0/0	unassigned	NO	unset	up	up
FastEthernet0/1	unassigned	NO	unset	up	down

Step 9 Select one of the available interfaces for connecting the router to the management network:

Enter interface name used to connect to the management network from the above interface summary: **fastethernet0/0**

Step 10 Respond to the following prompts as appropriate for your network:

Configuring interface FastEthernet0/0:
Use the 100 Base-TX (RJ-45) connector? [yes]: **yes**
Operate in full-duplex mode? [no]: **no**
Configure IP on this interface? [yes]: **yes**
IP address for this interface: **172.1.2.3**
Subnet mask for this interface [255.255.0.0] : **255.255.0.0**
Class B network is 172.1.0.0, 16 subnet bits; mask is /16

Step 11 The configuration is displayed:

The following configuration command script was created:

```
hostname fig
enable secret 5 $1$D5P6$PYx41/lQIASK.HcSbf05q1
enable password xxxxxx
line vty 0 4
password xxxxxx
snmp-server community public
!
no ip routing

!
interface FastEthernet0/0
no shutdown
media-type 100BaseX
half-duplex
ip address 172.1.2.3 255.255.0.0
!
interface FastEthernet0/1
shutdown
no ip address
!
end
```

Step 12 Respond to the following prompts. Select [2] to save the initial configuration.:

```
[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.
```

```
Enter your selection [2]: 2
Building configuration...
Use the enabled mode 'configure' command to modify this configuration.
```

Press RETURN to get started!

Step 13 The user prompt appears:

```
2600>
```

After you complete the initial configuration tasks, your Cisco router is ready to configure for specific functions. For configuration procedures, refer to the [Software Configuration Guide for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers](#), or the [Cisco IOS software configuration documentation](#). You can access these documents on Cisco.com and on the Documentation CD-ROM.

Initial Configuration Using the CLI (Manual Configuration)

This section shows how to bring up a command-line interface (CLI) prompt for configuration using the CLI, and it directs you to documentation for the CLI configuration. You can use the CLI if you see the following messages at the end of the startup sequence:

```
--- System Configuration Dialog ---
```

```
At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.
```

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

**Note**

If these messages do not appear, SDM and a default configuration file have been installed on the router at the factory. To use SDM to configure the router, refer to the quick start guide that shipped with your router. You can also access the [Cisco2600 series routers quick start guides](http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis2600/26xx_qsg/index.htm) online at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis2600/26xx_qsg/index.htm

**Note**

To avoid losing work you have completed, be sure to save your configuration occasionally as you proceed. Use the **copy running-config startup-config** command to save the configuration to NVRAM.

Step 1 To proceed with manual configuration using the CLI, enter **no**:

```
Would you like to enter the initial configuration dialog? [yes/no]: no
```

Step 2 Press **Return** to terminate autoinstall and continue with manual configuration:

```
Would you like to terminate autoinstall? [yes] Return
```

Several messages are displayed, ending with a line similar to the following:

```
...
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled <date> <time> by <person>
```

Step 3 Press **Return** to bring up the Router> prompt:

```
...
flashfs[4]: Initialization complete.
Router>
```

Step 4 Enter privileged EXEC mode:

```
Router> enable
Router#
```

For configuration using the CLI, refer to the [Software Configuration Guide for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series Routers](#), or the [Cisco IOS software configuration documentation](#). You can access these documents on Cisco.com and on the Documentation CD-ROM.



Troubleshooting

Your Cisco 2600 series router goes through extensive testing and burn-in before leaving the factory. If you encounter problems, use the information in this appendix to help isolate problems or to eliminate the router as the source of the problem.

- [Isolating Problems, page A-1](#)
- [System Messages, page A-4](#)
- [Recovering a Lost Password, page A-4](#)
- [Cisco Technical Assistance Center, page A-4](#)



Note

To troubleshoot a network module, refer to the [Cisco Network Modules Installation Guide](#); to troubleshoot a WAN interface card, refer to the [Cisco Interface Cards Installation Guide](#).

If you cannot locate the source of the problem, contact a customer service representative for information on how to proceed. For information about obtaining technical support, see the [“Obtaining Technical Assistance” section on page xviii](#). Before you call, have the following information ready:

- Chassis type and serial number
- Maintenance agreement or warranty information
- Type of software and version number
- Date you received the new chassis
- Brief description of the problem
- Brief explanation of the steps you have taken to isolate the problem

Isolating Problems

The key to problem solving is to isolate the problem to a specific subsystem by comparing what the router is doing to what it should be doing.

The LEDs on the front and rear panel of the router enable you to determine router performance and operation. For a description of these LEDs, see the [“Reading the Front-Panel LEDs” section on page 1-3](#) and the [“Reading the Rear-Panel LEDs” section on page 1-5](#).

When problem solving, consider the following subsystems:

- Power and cooling systems—External power source, power cable, router power supply and circuit breaker, and router blower and fan. Also consider inadequate ventilation or air circulation.

- Modules—LEDs on the modules can help identify a failure.
- Cables—External cables that connect the router to the network.

Troubleshooting the Power and Cooling Systems

Both the system LED and the fans can help you troubleshoot a power problem. Check the following items to help isolate the problem:

- With the power switch on, does the system LED stay on or blink?
 - If the LED is green, the router is receiving power and is functional.
 - If the LED is off, check the power source and power cable.
- With the power switch on and the system LED on, do the fans operate?
 - If no, check the fans.
- With the power switch on and the system LED off, do the fans operate?
 - If yes, the router is receiving power. The fans are connected directly to the DC outputs of the power supply.
 - If no, check the power source and power cable.
- Does the router shut down after being on a short time?
 - Check for an environmentally induced shutdown. See the [“Environmental Reporting Features” section on page A-2](#).
 - Check the environmental site requirements in the [“General Site Requirements” section on page 2-3](#).
 - Check for a power supply failure by inspecting the system LED on the front panel. If the system LED is on or blinking, the power supply should be functional.
- Router partially boots, but LEDs do not come on.
 - Check for a power supply failure by inspecting the system LED on the front panel of the router. If the system LED is on, the power supply is functional.
 - If the system LED is not on, refer to the warranty information in the quick start guide that shipped with your router, or contact customer service. The quick start guide is also available on the Cisco Documentation CD-ROM and online.

Environmental Reporting Features

If the router is operating at an abnormally high temperature, you see the following message on the console screen:

```
%SYS-1-OVERTEMP: System detected OVERTEMPERATURE condition. Please resolve cooling problem immediately!
```

Some causes of abnormally high router temperature are:

- Fan failure
- Air conditioner failure in the room
- Air blockage to cooling vents

Take steps to correct the problem. See also the [“Site Environment” section on page 2-3](#), and the [“Equipment Racks” section on page 2-4](#).

Troubleshooting Modules, Cables, and Connections

Network problems can be caused by a module; cables or cable connections; or external devices such as a modem, transceiver, hub, wall jack, WAN interface, or terminal. Check for the following symptoms to help isolate the problem:

**Tip**

All the documents mentioned in this section are available both on the Documentation CD-ROM and online.

- Module is not recognized by the router.
 - Make sure that the module is firmly seated in its slot.
 - Check the LEDs on the module. Each module has its own set of LEDs. For information on these LEDs, refer to the online publication [Cisco Network Modules Installation Guide](#).
 - Make sure that you have a version of Cisco IOS software that supports the network module. Check the [Cisco Network Modules Installation Guide](#) or accompanying configuration note for the affected module's software requirements.
- Module is recognized, but interface ports do not initialize.
 - Make sure that the module and interface card are firmly seated in their slots.
 - Check external cable connections.
 - Make sure that you have a version of Cisco IOS software that supports the network module and interface card. Check the [Cisco Network Modules Installation Guide](#) and the [Cisco Interface Cards Installation Guide](#) or accompanying configuration notes for the affected network module's and interface card's software requirements.
- Router does not boot properly, or constantly or intermittently reboots.
 - Make sure that all modules are firmly seated in their slots.
 - Check the router chassis or software. Refer to the warranty information in the quick start guide that shipped with your router, or contact customer service.
- Router boots, but the console screen is frozen.
 - Check the external console connection.
 - Verify that the parameters for your terminal are set as follows:
 - (a) The same data rate as configured for the router (9600 bps is the default)
 - (b) 8 data bits
 - (c) No parity generated or checked
 - (d) 1 stop bit
- Router powers on and boots only when a particular module is removed.
 - Check the module. Refer to the warranty information in the quick start guide that shipped with your router, or contact customer service.
- Router powers on and boots only when a particular cable is disconnected.
 - There may be a problem with the module or cable. Refer to the warranty information in the quick start guide that shipped with your router, or contact customer service.

System Messages

This section describes system error and recovery messages that may appear when operating a Cisco 2600 series router. Error messages for Cisco 2600 series routers powered by the Cisco redundant power system are described in the publication *Cisco RPS Installation Guide*.

The Cisco IOS software displays system error and recovery messages on an external device console terminal screen. (For more information, see the “[Connecting to a Console Terminal or Modem](#)” section on page 3-20.)

The terminal should display one of the following prompts:

Router> (indicates user EXEC mode)

or

Router# (indicates privileged EXEC mode)

The Cisco IOS software checks the system condition once every 30 seconds. If the condition still exists, the system error message reappears; if the system error condition has cleared, a recovery message appears.

To see descriptions of the system error and recovery messages and LED conditions that might accompany them, refer to the *Cisco IOS System Error Messages* online document at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122sup/122sems/semsvol1/emfbgp.htm#xtocid10>

Recovering a Lost Password

You can recover a lost enable password, but an enable secret password is encrypted and is not recoverable. If you lose an enable secret password that is configured on your router, you can replace it with a new enable secret password.

For password recovery and replacement procedures for the Cisco 2600 series routers, refer to the *Password Recovery Procedure for the Cisco 2600 Series Routers* document at the following URL:

http://www.cisco.com/warp/public/474/pswdrec_2600.shtml

Cisco Technical Assistance Center

The following link connects you to release notes, field notices, security advisories, and troubleshooting information maintained by the Cisco Technical Assistance Center (TAC):

http://www.cisco.com/pcgi-bin/Support/browse/psp_view.pl?p=Hardware:2600&s=Troubleshooting



Using the ROM Monitor

This appendix describes the use of the ROM monitor (also called the bootstrap program), which is the firmware that runs when you power up or restart a Cisco router. During normal operation, the ROM monitor helps to initialize the processor hardware and boot the operating system software. You can also use the ROM monitor to:

- Help isolate hardware problems encountered when installing your router.
- Download a new Cisco IOS image if the operating image is corrupted.

This appendix contains the following sections:

- [Entering ROM Monitor Mode, page B-1](#)
- [ROM Monitor Commands, page B-2](#)
- [ROM Monitor Command Syntax Conventions, page B-3](#)
- [ROM Monitor Command Descriptions, page B-4](#)
- [Recovering Cisco IOS Software Images, page B-8](#)

Entering ROM Monitor Mode

To use the ROM monitor, you must have access to the console port. Refer to the [“Connecting to a Console Terminal or Modem” section on page 3-20](#) for information on connecting the console cable.

There are two ways of entering the ROM monitor mode:

- Use the **reload** command and the Break key to enter the ROM monitor mode for one-time use.
Break (system interrupt) is always enabled for 60 seconds after the router reboots, regardless of whether Break is configured on or off in the configuration register (see [Appendix C, “Configuration Register.”](#)). During this 60-second period, you can break to the ROM monitor prompt by pressing the Break key.



Note

If your console terminal does not have a Break key, refer to the terminal emulator documentation for instructions on generating a break (system interrupt).

- Set the configuration register so that the router enters the ROM monitor mode whenever it boots.
The new configuration register value, 0x0, is effective after the router is rebooted with the **reload** command. The router remains in the ROM monitor and does not boot the operating system.

As long as the configuration register value remains 0x0, you must manually boot the operating system from the console. Refer to the **boot** command in the “[ROM Monitor Command Descriptions](#)” section on page B-4.

The two methods of entering the ROM monitor mode are as follows:

Enter ROM Monitor Mode by Using the reload Command

Connect to the router from a console, and follow these steps:

-
- Step 1** Restart the router with the **reload** command.
- ```
Router# reload
```
- Step 2** Press the **Break** key during the first 60 seconds of the system booting.
- This forces the router into ROM monitor mode, and the ROM monitor prompt is displayed:
- ```
rommon 1>
```
-

Enter ROM Monitor Mode by Resetting the Configuration Register

Connect to the router from a console, and follow these steps:

-
- Step 1** Set the bits 3, 2, 1, and 0 of the configuration register to zero:
- ```
Router# configuration-register 0x0
```
- Step 2** Restart the router with the **reload** command:
- The router boots into the ROM monitor mode, and the ROM monitor prompt is displayed:
- ```
rommon 1>
```
-



Note

The number that appears in the ROM monitor prompt (1>, 2>, and so forth) is the line number. It increments each time you enter a ROM monitor command.

ROM Monitor Commands

Showing ROM Monitor Commands

Enter **?** or **help** at the ROM monitor prompt to see a list of available commands. For example:

```
rommon 1> ?
alias      set and display aliases command
boot       boot up an external process
break      set/show/clear the breakpoint
confreg    configuration register utility
cont       continue executing a downloaded image
context    display the context of a loaded image
cookie     display contents of cookie PROM in hex
dev        list the device table
```

```

dir          list files in the file system
dis          display instruction stream
dnld         serial download a program module
frame        print out a selected stack frame
help         monitor builtin command help
history      monitor command history
iomemdef     set IO mem to a default 25%
meminfo      main memory information
repeat       repeat a monitor command
reset        system reset
rommon-pref  select ROMMON
set          display the monitor variables
stack        produce a stack trace
sync         write monitor environment to NVRAM
sysret       print out info from last system return
tftpdnld     tftp image download
unalias      unset an alias
unset        unset a monitor variable
xmodem       x/ymodem image download
rommon 2>

```

**Note**

Not all ROM monitor commands are available on all platforms.

Displaying Information About ROM Monitor Command Syntax

To display information about command syntax, enter the command name followed by `-?`.

Entering ROM Monitor Commands

ROM monitor commands are case-sensitive. Enter commands exactly as shown.

Interrupting ROM Monitor Commands

You can end any command by generating a Break (system interrupt) at the console.

ROM Monitor Command Syntax Conventions

The ROM monitor syntax in this appendix uses the following conventions:

- Square brackets [] denote an optional element. In the following example, the element **abc** is not required, but you can specify it if you choose:
command [abc]
- If a minus option is followed by a colon (for example, [-s:]) you must provide an argument for the option.
- A term in *italics* means that you must fill in the appropriate information. In the following example, you replace the term in *italics* with the interface type you are using:

command *interface-type*

ROM Monitor Command Descriptions

Router Management Commands

This section lists some useful ROM monitor commands. Refer to the Cisco IOS configuration guides and command references for more information on ROM monitor commands.

Boot Commands in the ROM Monitor

Functions of Boot Commands

The router always boots first from a Cisco IOS image in flash memory, because there is no separate, dedicated boothelper image ([rx]boot). The first image in flash memory functions as the boothelper image, but you can override this by setting the BOOTLDR Monitor environment variable to point to another image. If the ROM monitor does not recognize a device ID specified in the **boot** command (device does not exist, or command entered incorrectly), the router boots from the first image in flash memory.

To boot a router from a Cisco IOS image on a TFTP server (netboot), the installed DRAM must be adequate to hold two uncompressed Cisco IOS images: the image from flash memory and the image downloaded from the TFTP server.

If the router is configured to boot from a TFTP server (boot bits in the configuration register are set from 2 to 15), the router first boots from the image in flash memory. It decompresses that image in DRAM, parses the boot system commands, downloads the Cisco IOS image from the TFTP server, and decompresses it in DRAM. After the Cisco IOS image from the TFTP server is in DRAM, the DRAM memory occupied by the boothelper image is released.

**Note**

Booting from a TFTP server is useful if the router does not have enough flash memory to hold large images. With a small image in flash memory (just large enough to support the necessary interfaces), the router boots from flash memory, and then the larger image is downloaded from the TFTP server.

Entering Boot Commands

The **boot** command syntax is as follows, where:

- *partition* is a partition number in the flash memory.
- *filename* is the Cisco IOS image filename.
- *tftpserver* is the IP address of the TFTP server.
- **-x** directs the router to load the image but not execute the boot process.
- **-v** (verbose) specifies that progress print setting messages and error information be displayed.

boot [**flash:** [*partition:* [*filename*]] | **slot0:** [*partition:* [*filename*]] | **slot1:** [*partition:* [*filename*]] | *filename tftpserver*] [**-x**] [**-v**]

Some examples of **boot** commands are as follows:

**Note**

In all **boot** commands, **boot** can be entered as **b**.

- **boot**—Boots from the first Cisco IOS image in internal flash memory.
- **boot flash**—Boots from the first Cisco IOS image in the internal Flash memory.
- **boot flash: partition**—Boots from the first Cisco IOS image in the specified partition in internal flash memory.
- **boot flash: filename**—Boots from the Cisco specified IOS image in internal flash memory.
- **boot flash: partition: filename**—Boots from the specified Cisco IOS image in the specified partition in internal flash memory.
- **boot slot0**—(Cisco 2691 only) Boots from the first Cisco IOS image in the first partition in flash memory in slot 0.
- **boot slot0:2**—(Cisco 2691 only) Boots from the first Cisco IOS image in the second partition in compact flash memory in slot 0.
- **boot slot0: filename**—(Cisco 2691 only) Boots from the specified Cisco IOS image in compact flash memory in slot 0.
- **boot slot1:3: filename**—(Cisco 2691 only) Boots from the specified Cisco IOS image in the third partition in compact flash memory in slot 1.
- **boot filename tftpserver**—Boots from the specified Cisco IOS image on the specified TFTP server (after first booting from flash). For example:

boot c2600-i-mz 172.15.19.11



Note

Use the CLI commands **show version** and **show hardware** to see the source of the currently running Cisco IOS image.

Informational Commands in the ROM Monitor

dev—(Cisco 2691 only) Lists boot device identifications on the router, for example:

```
rommon 2 > dev
```

Devices in device table:

```
      id  name
flash:  internal compact flash
slot0:  external compact flash
eprom:  eprom
rommon 3 >
```

dir device:[partition:]—Lists the files on the named device. For example:

```
rommon 8> dir flash:
```

File size	Checksum	File name
2229799 bytes (0x220627)	0x469e	C2600-j-m2.113-4T

help—Shows a summary of ROM monitor commands (equivalent to ?).

meminfo—Displays main memory size, starting address, and available range; size of packet memory; and size of NVRAM. The following example shows the **meminfo** command:

```
rommon 9> meminfo
```

```
Main memory size: 32 MB.
Available main memory starts at 0xa000e000, size 32704KB
IO (packet) memory size: 25 percent of main memory.
NVRAM size: 32KB
```

meminfo [-l]—The **meminfo** command with the **-l** option shows supported DRAM configurations. The following example shows an example of the **meminfo -l** command:

```
rommon 10> meminfo -l
```

Supported memory configurations:

DIMM 0	DIMM 1

	4M
	8M-DUAL
	16M
	32M-DUAL
4M	
4M	4M
4M	8M-DUAL
4M	16M
4M	32M-DUAL
8M-DUAL	
8M-DUAL	4M
8M-DUAL	8M-DUAL
8M-DUAL	16M
8M-DUAL	32M-DUAL
16M	
16M	4M
16M	8M-DUAL
16M	16M
16M	32M-DUAL
32M-DUAL	
32M-DUAL	4M
32M-DUAL	8M-DUAL
32M-DUAL	16M
32M-DUAL	32M-DUAL

Other Useful ROM Monitor Commands

reset or **i**—Resets and initializes the router, similar to power on.

tftpdnld—(Except Cisco 2691) Downloads an image using TFTP from a remote server. See the [“Copying an Image from a TFTP Server Using the tftpdnld Command” procedure on page B-10](#).

Debugging Commands

Most debugging commands are functional only when Cisco IOS software has crashed or failed to initialize (boot). Debugging commands should normally be entered only under the direction of a Cisco engineer. If you enter a debugging command and Cisco IOS crash information is not available, the following error message appears:

```
"xxx: kernel context state is invalid, cannot proceed."
```

The following ROM monitor debugging commands provide information about software failures:

- **stack** or **k**—Produces a stack trace.
- **context**—Views processor context.
- **frame**—Views an individual stack frame.

- **sysret**—Views return information from the last booted system image. This information includes the reason for terminating the image, a stack dump of up to eight frames, and, if an exception is involved, the address where the exception occurred. For example:

```
rommon 8> sysret

System Return Info:
count: 19, reason: a SegV exception
pc:0x802b1040, error address: 0x802b1040
Stack Trace:
FP: 0x80908398, PC: 0x802b102c
FP: 0x809083b0, PC: 0x802b0b88
FP: 0x809083d8, PC: 0x8017039c
FP: 0x809083e8, PC: 0x8016f764
```

Configuration Register Commands

The configuration register resides in NVRAM. You can view or modify the configuration register from either the ROM monitor or the operating system software.

For procedures used to change the configuration register from the operating system, and for information about configuration register settings, see [Appendix C, “Configuration Register.”](#)

To modify the configuration register from the ROM monitor, you can:

- Enter the **confreg** command by itself for menu mode. See the [“Modifying the Configuration Register in Menu Mode”](#) section below.
- Enter the **confreg** command plus the new hexadecimal value of the configuration register. See the [“Modifying the Configuration Register by Hexidecimal Entry”](#) section on page B-8.

In either case, the new configuration register value is written into NVRAM, but is not effective until you reboot (using the ROM monitor **reset** command) or power cycle the router.

Modifying the Configuration Register in Menu Mode

Entering the **confreg** command without an argument displays the contents of the configuration register, and prompts you to alter the contents by describing the meaning of each bit.

The following display shows an example of the **confreg** command:

```
rommon 7> confreg

Configuration Summary
enabled are:
break/abort has effect
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration? y/n [n]: y
enable "diagnostic mode"? y/n [n]: y
enable "use net in IP bcast address"? y/n [n]:
enable "load rom after netboot fails"? y/n [n]:
enable "use all zero broadcast"? y/n [n]:
disable "break/abort has effect"? y/n [n]:
enable "ignore system config info"? y/n [n]:
change console baud rate? y/n [n]: y
enter rate: 0 = 9600, 1 = 4800, 2 = 1200, 3 = 2400
           4 = 19200, 5 = 38400, 6 = 57600, 7 = 115200 [0]: 0
change the boot characteristics? y/n [n]: y
```

```

enter to boot:
 0 = ROM Monitor
 1 = the boot helper image
 2-15 = boot system
[0]: 0

Configuration Summary
enabled are:
diagnostic mode
break/abort has effect
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration? y/n [n]:

You must reset or power cycle for new config to take effect

```

Modifying the Configuration Register by Hexidecimal Entry

Entering the **confreg** command plus a hexadecimal value changes the contents of the configuration register. The syntax is **confreg** [*hexnum*]; values entered are always interpreted as hexadecimal. The following example changes the value of the configuration register to the factory default:

```
rommon 7> confreg 0x2102
```

You must reset or power cycle the router for new configuration to take effect.

Recovering Cisco IOS Software Images

If your Cisco router experiences difficulties and no longer contains a valid Cisco IOS software image in flash memory, you can download a new Cisco IOS image using one of the following ROM monitor commands:

- **xmodem**—(All Cisco 2600 series routers) Use this command to copy a Cisco IOS image from the console, if the computer attached to your console has a terminal emulator with Xmodem capability. See the [“Copying an Image from the Console Using the xmodem Command” procedure on page B-9](#).



Note

Downloading a Cisco IOS image from a console is very slow. This procedure should be used only in an emergency and is not recommended for normal Cisco IOS image upgrades.

For the fastest possible download from a console, set the console speed to 115200 bps by using the **confreg** ROM monitor command. See the [“Configuration Register Commands” procedure on page B-7](#).

- **tftpdnld**—(Except Cisco 2691) Use this command to copy a Cisco IOS image from a TFTP server that is accessible through the FastEthernet 0/0, Ethernet 0/0, or Token Ring 0/0 port. See the [“Copying an Image from a TFTP Server Using the tftpdnld Command” procedure on page B-10](#).

**Note**

The **tftpdnld** command is not available on the Cisco 2691 router. The recommended method for installing a Cisco IOS image on a Cisco 2691 router is from a CompactFlash memory card loaded in the external CompactFlash memory card slot. See the [“Entering Boot Commands” procedure on page B-4](#).

Copying an Image from the Console Using the xmodem Command

Description and Options of the xmodem Command

The **xmodem** command establishes a connection between a console and the router console port for disaster recovery, if both the boot and system images are erased from flash memory.

xmodem [*filename*]
—Establishes an Xmodem connection between the console and the router. The optional argument *filename* specifies the source file containing the Cisco IOS image.

Other options include the following:

- **c**—Use cyclic redundancy check (CRC-16).
- **y**—Use Ymodem transfer protocol.
- **r**—Copy the image to dynamic random-access memory (DRAM) for launch.
- **x**—Do not launch image on completion of download.

Console Requirements

The console computer (PC) must have the following files to use this procedure:

- Terminal emulation application program supporting one of the following file transfer protocols:
 - Xmodem
 - Xmodem–CRC
 - Xmodem–1K
 - Ymodem
- Cisco IOS image file

Procedure for the xmodem Command

To copy a Cisco IOS image from a console to flash memory, perform the following procedure.

**Note**

File transfer from a console is slow and will take many minutes.

- Step 1** Connect a console to the router’s console port using the instructions in the [“Connecting to a Console Terminal or Modem” section on page 3-20](#).
- Step 2** Power up the router. The power-on self-test diagnostics run and the boot ROM searches for a valid boot image and Cisco IOS image in flash memory. If the boot image and Cisco IOS image are not found, the ROM monitor prompt is displayed:

```
rommon 1>
```

Step 3 Enter the **xmodem** command and the name of the source file containing the Cisco IOS image:

```
rommon 1> xmodem filename
```

When the source file is found, messages similar to the following appear:

```
Do not start upload program yet...
File size      Checksum   File name
2537948 bytes  (0x26b9dc) c2600-i-mz.122-10.bin

WARN: This operation will ERASE bootflash. If the xmodem
download to bootflash fails, you will lose any good image
you may already have in bootflash.
Invoke this application only for disaster recovery.

Do you wish to continue? [yes/no]:
```

Step 4 Enter **yes** to copy the Cisco IOS image into flash memory. Messages similar to the following appear:

```
Ready to receive file prog ...

Erasing flash at 0x3000000

program flash location 0x3000000

Transfer complete!
```

The router is now ready to boot from the Cisco IOS image. Enter the **reset** ROM monitor command to reboot the router.



Note

If you have set the console speed to 115200, you may want to reset it to the previous speed or to the factory default speed (typically 9600 bps). See the [“Configuration Register Commands” procedure on page B-7](#).

Copying an Image from a TFTP Server Using the **tftpdnld** Command

The **tftpdnld** command downloads a Cisco IOS software image from a remote server accessible from a FastEthernet, Ethernet, or Token Ring network interface on a Cisco 2600 series router (except Cisco 2691). The **tftpdnld** command downloads the Cisco IOS software image into flash memory using TFTP.

Restrictions on the **tftpdnld** Command

The following software restrictions apply when using the **tftpdnld** command:

- Ethernet and FastEthernet—Accepts and sends only Ethernet V2.0 data packets.
- Token Ring—Accepts and sends only Token Ring frames with IEEE802.3 SNAP frames. Does not support any frames with routing information fields (RIFs), limiting all use of the **tftpdnld** command to a TFTP server on the local ring. If the TFTP server resides off the local ring, you must establish a path to the server through a router or transparent bridge from the local ring.

Procedure for the tftpdnld Command

Step 1 Specify the required variables, for example:

```
rommon 1> IP_ADDRESS=172.15.19.11
rommon 2> IP_SUBNET_MASK=255.255.255.0
rommon 3> DEFAULT_GATEWAY=172.16.19.1
rommon 4> TFTP_SERVER=172.15.20.10
rommon 5> TFTP_FILE=/tftpboot/c2600-i-mz
```

The syntax for specifying the variables is:

VARIABLE_NAME=value

The variables that you must specify include the following:

- IP_ADDRESS—IP address for the router you are using.
- IP_SUBNET_MASK—Subnet mask for the router you are using.
- DEFAULT_GATEWAY—Default gateway for the router you are using (not required if the TFTP server is in the same subnet as the router).
- TFTP_SERVER—IP address of the server from which you want to download the image file.
- TFTP_FILE—Name of the file that you want to download.

The following **tftpdnld** command variables are optional:

- TFTP_VERBOSE—Print setting. The default is 1.
 - 0=quiet—After you enter the **tftpdnld** command, the prompt
Do you wish to continue? y/n:
is the only information that appears until the command completes successfully or fails.
 - 1=progress—Displays the state of the required **tftpdnld** command variables. Also displays progress characters to indicate successful and lost packet transmissions.
 - 2=verbose—Displays all progress print setting messages, along with error information. The information provided by this print setting may be useful when debugging interface link and configuration problems that may prevent connecting to the TFTP server.
- TFTP_RETRY_COUNT—Number of times from 1 to 65535 that the ROM monitor will retry address resolution protocol (ARP) and acknowledge (ACK). The default is 7 retries.
- TFTP_TIMEOUT—Overall timeout of the download operation in seconds. The range is from 1 to 65535 seconds. The default is 7200 seconds.
- TFTP_CHECKSUM—Performs a checksum test on the image. 0=checksum off, 1=checksum on. The default is 1.
- FE_SPEED_MODE—Sets the Fast Ethernet speed and duplex mode. 0=10 Mbps half-duplex mode, 1=10 Mbps full-duplex mode, 2=100 Mbps half-duplex mode, 3=100 Mbps full-duplex mode, and 4=auto-negotiation. The default is 4.



Note Specify the FE_SPEED_MODE variable only for routers with a Fast Ethernet network interface.

- TR_SPEED_MODE—Sets the Token Ring speed and duplex mode. 0=4 Mbps half-duplex mode, 1=4 Mbps full-duplex mode, 2=16 Mbps half-duplex mode, and 3=16 Mbps full-duplex mode. The default is 2.

**Note**

Specify the `TR_SPEED_MODE` variable only for routers with a Token Ring network interface; or for routers with both an Ethernet and a Token Ring port, those routers that are set to use the Token Ring port with the **`tftpdnld`** command.

- `TR_1E1R_PORT`—Sets the port to be used with the **`tftpdnld`** command. 0=Use Ethernet port; 1=Use Token Ring port. The default is 0.

**Note**

Specify the `TR_1E1R_PORT` variable only for those routers with both an Ethernet and a Token Ring port.

Step 2 Enter the **`tftpdnld [-h] [-r]`** command:

Options include the following:

- **`h`**—Displays the **`tftpdnld`** command help screen.
- **`r`**—Loads the Cisco IOS software image only to DRAM and launches the image without writing the image into flash memory.

```
rommon 6> tftpdnld

IP_ADDRESS=172.15.19.11
IP_SUBNET_MASK=255.255.255.0
DEFAULT_GATEWAY=172.16.19.1
TFTP_SERVER=172.15.20.10
TFTP_FILE=/tftpboot/2600-i-mz
```

Invoke this command for disaster recovery only.

WARNING: all existing data in all partitions on flash will be lost!

Do you wish to continue? y/n: [n]:

Step 3 Enter **`y`** to download the Cisco IOS software image. When the process is complete, the ROM monitor mode prompt appears on your screen.

```
rommon 7>
```

The router is now ready to boot from the Cisco IOS image. Enter the **`boot`** ROM monitor command to reboot the router.



Configuration Register

This appendix describes the factory default settings of the configuration register, and procedures for changing those settings.

This appendix has the following sections:

- [Configuration Register Settings, page C-1](#)
- [Changing Configuration Register Settings, page C-2](#)
- [Configuring the Boot Field, page C-3](#)
- [Enabling Booting from Flash Memory, page C-5](#)

Configuration Register Settings

The router has a 16-bit configuration register in NVRAM. You can use the configuration register to perform the following tasks:

- Set and display the configuration register value
- Force the router into the ROM monitor (bootstrap program)
- Select a boot source and default boot filename
- Enable or disable the Break function
- Control broadcast addresses
- Load operating software from ROM

[Table C-1](#) describes each configuration register bit.

Table C-1 Configuration Bit Meanings

Bit Number	Hexadecimal	Meaning
00–03	0x0000-0x000F	Boot field. (See Table C-2 .)
06	0x0040	Causes the system software to ignore the contents of NVRAM.
07	0x0080	OEM bit enabled.
08	0x0100	Break disabled.
09	0x0200	Causes the system to use the secondary bootstrap. This is typically not used (set to 0).

Table C-1 Configuration Bit Meanings (continued)

Bit Number	Hexadecimal	Meaning
10	0x0400	IP broadcast with all zeros.
5, 11, 12	0x0020, 0x0800, 0x1000	Console line speed.
13	0x2000	Boots default ROM software if the network boot fails.
14	0x4000	IP broadcasts do not have net numbers.
15	0x8000	Enables diagnostic messages and ignores the contents of NVRAM.

Changing Configuration Register Settings

You might want to modify the value in the configuration register to perform the following tasks:

- Recover a lost password
- Change the console data rate
- Enable or disable the Break function
- Manually boot the operating system using the **b** command at the ROM monitor prompt
- Force the router to automatically boot its system image in flash memory, or boot in accordance with any **boot system** commands stored in the router's configuration file in NVRAM

You can change the configuration register from either the ROM monitor or the operating system software. To change the configuration register from the ROM monitor, see the [“Configuration Register Commands” section on page B-7](#). To change the configuration register from the system software, do the following:

- Step 1** Connect a console terminal to the console port of the router as described in the [“Connecting to the Console Port” section on page 3-20](#), using the blue RJ-45 to DB-9 console adapter cable.



Note

If you have a terminal with a DB-25 port, use an RJ-45 rollover cable and DB-25 adapter. The RJ-45-to-DB-25 adapter (Cisco part number 29-0810-01) can be purchased from Cisco.

For information about cable pinouts, refer to the online document [Cisco Modular Access Router Cable Specifications](#). This document is available online and on the Cisco Documentation CD-ROM.

- Step 2** Configure your terminal or terminal emulation software for 9600 baud (default), 8 data bits, no parity, and 1 stop bit.
- Step 3** Power on the router.
- Step 4** When asked if you would like to enter the initial dialog, answer **no**:
- ```
Would you like to enter the initial dialog? [yes]: no
```
- Your router is now in the normal operating mode.
- Step 5** After a few seconds, you see the user EXEC prompt (`Router>`). Enter the **enable** command and your password to enter privileged EXEC mode:

```
Router> enable
```

```
Password: password
```

- Step 6** At the privileged EXEC prompt (Router#), enter the **configure terminal** command:

```
Router# configure terminal
```

```
Enter configuration commands, one per line.
```

```
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
```

- Step 7** Enter the **config-register value** command, where *value* is a hexadecimal number preceded by 0x (see [Table C-2](#)), to set the contents of the configuration register:

```
Router# config-register 0x value
```



**Note**

Cisco IOS software does not allow you to change the console speed bits directly with the **config-register** command. To change the console speed, complete this sequence:

```
Router# configure terminal
```

```
Router(config)# line console 0
```

```
Router(config-line)# speed 9600
```

- Step 8** Press **Ctrl-z** to exit configuration mode.

- Step 9** Copy the new console speed to NVRAM:

```
Router> copy run start
```

The new settings are saved to NVRAM, but they are not effective until the router restarts; for example, when you switch the power off and on or when you enter a **reload** command from the console.

- Step 10** Enter the **show version** command to display the configuration register value currently in effect and the value that will be used at the next reload. The value is shown on the last line of the display:

```
Configuration register is 0x142 (will be 0x142 at next reload)
```

- Step 11** Reboot the router. The new value is effective after the router reboots.

## Configuring the Boot Field

The lowest four bits of the configuration register (bits 3, 2, 1, and 0) form the boot field. (See [Table C-2](#).)

**Table C-2 Explanation of Boot Field Configuration Register Bits (00-03)**

| Boot Field | Meaning                                                                             |
|------------|-------------------------------------------------------------------------------------|
| 00         | Stays at the ROM monitor on a reload or power cycle                                 |
| 01         | Boots the first image in flash memory as a system image                             |
| 02-F       | Enables default booting from flash memory                                           |
|            | Enables <b>boot system</b> commands that override default booting from flash memory |

The boot field specifies a number in binary form. If you set the boot field value to 0, you must have console port access to boot the operating system manually. Refer to the **boot** command in the “ROM Monitor Command Descriptions” section on page B-4.

If you set the boot field to a value of 2 to F, and there is a valid **boot system** command stored in the configuration file, the router software processes each **boot** command in sequence until the process is successful or the end of the list is reached. If there are no **boot** commands in the configuration file, the router attempts to boot the first file in flash memory.

In the following example, the configuration register is set to boot the router automatically from flash memory and to ignore Break at the next reboot of the router:

```
Router# configure terminal

Enter configuration commands, one per line.
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
config-register 0x102
Ctrl-z
```


**Note**

A **boot system** command in the router configuration in NVRAM overrides booting from flash memory.

Bit 8 controls the console Break key. Setting bit 8 (the factory default) causes the processor to ignore the console Break key. Clearing bit 8 causes the processor to interpret Break as a command to force the router into the bootstrap monitor, halting normal operation. Break can always be sent in the first 60 seconds while the router is rebooting, regardless of the configuration settings.

Bit 9 controls the system boot. Clearing bit 9 (the factory default) causes the system to boot from flash memory. Clearing bit 9 causes the system to use the secondary bootstrap (netbooting). This is typically not used.

Bit 10 controls the host portion of the IP broadcast address. Setting bit 10 causes the processor to use all zeros; clearing bit 10 (the factory default) causes the processor to use all ones. Bit 10 interacts with bit 14, which controls the network and subnet portions of the broadcast address. Table C-3 shows the combined effect of bit 10 and bit 14.

**Table C-3 Configuration Register Settings for Broadcast Address Destination**

| Bit 10 | Bit 14 | Address (<net> <host>) |
|--------|--------|------------------------|
| Off    | Off    | <ones> <ones>          |
| On     | Off    | <zeros> <zeros>        |
| On     | On     | <net> <zeros>          |
| Off    | On     | <net> <ones>           |

Bit 13 determines the router's response to a bootload failure. Setting bit 13 causes the router to load operating software from ROM after six unsuccessful attempts to load a boot file. Clearing bit 13 causes the router to continue indefinitely to attempt loading a boot file. By factory default, bit 13 is set to 0.

Bit 5, bit 11, and bit 12 of the configuration register determine the baud rate of the console terminal. Table C-4 shows the bit settings for the eight available rates. (The default baud rate is 9600 bps.)



**Table C-4 Console Terminal Baud Rate Settings**

| Baud   | Bit 5 | Bit 12 | Bit 11 |
|--------|-------|--------|--------|
| 115200 | 1     | 1      | 1      |
| 57600  | 1     | 1      | 0      |
| 38400  | 1     | 0      | 1      |
| 19200  | 1     | 0      | 0      |
| 9600   | 0     | 0      | 0      |
| 4800   | 0     | 0      | 1      |
| 2400   | 0     | 1      | 1      |
| 1200   | 0     | 1      | 0      |

## Enabling Booting from Flash Memory

To enable booting from flash memory, set bits 3, 2, 1, and 0 to a value between 2 to 15. To specify a filename to boot, enter the system software configuration command **boot system flash** *[device:] [partition:] [filename]* in the configuration file.

By specifying the device and partition in the command, you can configure the router to boot from the PCMCIA cards. If you specify only the filename, the router is configured to boot from flash memory.

To enter configuration mode while in the system software image, enter the **configure** command at the enable prompt as in the following example:

```
Router# configure
```

```
Configuring from terminal, memory, or network [terminal]? terminal
```

```
Enter configuration commands, one per line.
```

```
Edit with DELETE, CTRL/W, and CTRL/U; end with CTRL/Z
```

```
boot system flash filename
```

To disable Break and enable the **boot system flash** command, enter the **config-register** command with a value as follows:

```
config-reg 0x102
```

```
Ctrl-z
```

If you set the configuration register value to 0x102, as in this example, you do not need to enter the **boot system flash** command unless there is more than one image in flash memory.





---

## Symbols

? (help) command [B-2](#)

---

## Numerics

100 Mbps LED [1-7](#)

---

## A

AC power connection [3-15](#)

ACTIVITY LED [1-4](#)

ACT LED [1-7](#)

AIMs, installing [1-8](#)

asynchronous serial baud rates [2-12](#)

auxiliary port

connecting to [3-21 to 3-22](#)

description of [2-7 to 2-8](#)

---

## B

baud rate

of modem [3-21](#)

setting for console terminal [1-4](#)

boot command [B-4](#)

boothelper [B-4](#)

booting from Flash memory [1-5](#)

bracket attachment

rack-mount [3-5 to 3-10](#)

wall-mount [3-11](#)

---

## C

cables, provided [2-6](#)

Caution symbol, meaning of [ix](#)

chassis

desktop installation [3-3](#)

grounding [3-13](#)

rack-mounting [3-4](#)

wall-mounting [3-11](#)

Cisco IOS software

locating documentation [xv](#)

recovering images [B-8](#)

commands

? (help) [B-2](#)

boot [B-4](#)

configuration register [B-7](#)

confreg [B-7, B-8](#)

context [B-6](#)

debugging [B-6](#)

dev [B-5](#)

dir [B-5](#)

frame [B-6](#)

help [B-2, B-5](#)

i (Initialize) [B-6](#)

meminfo [B-5, B-6](#)

reload [B-1, B-2](#)

reset [B-6, B-10](#)

ROM monitor [B-1 to B-12](#)

stack [B-6](#)

sysret [B-7](#)

tftpdnld [B-6, B-8, B-10](#)

xmodem [B-8, B-9](#)

compact Flash memory card [1-2](#)

compliance [1-12](#)  
 configuration, site [2-4](#)  
 configuration register  
     boot field [1-4](#)  
     changing settings [B-7, 1-2](#)  
     enabling booting from Flash memory [1-5](#)  
 confreg command [B-7, B-8](#)  
 connections  
     AC power [3-15](#)  
     asynchronous/synchronous serial [2-12](#)  
     auxiliary port [2-8](#)  
     console port [2-7](#)  
     console terminal [3-20](#)  
     DCE [2-10](#)  
     DC power [3-16 to 3-17](#)  
     DSU/CSU [2-13](#)  
     DTE [2-10](#)  
     Ethernet [2-9](#)  
     ISDN BRI [2-12](#)  
     modem [3-20](#)  
     network [2-8](#)  
     serial [2-10](#)  
     Token Ring [2-9](#)  
 console port  
     connecting to [3-20 to 3-21](#)  
     description of [2-7](#)  
 console speed, setting [B-10](#)  
 context command [B-6](#)  
 cooling recommendations [2-4](#)

## D

DCE connections [2-10](#)  
 DC power connections [3-16 to 3-17](#)  
 debugging commands [B-6](#)  
 desktop installation [3-3](#)  
 dev command [B-5](#)  
 dimensions, chassis [1-11, 1-12](#)  
 dir command [B-5](#)

documentation  
     Cisco IOS software [xv](#)  
     on CD-ROM [xiv](#)  
     on the WEB [xiv](#)  
     related [xiv](#)  
 DRAM [1-2](#)  
 DSU/CSU connections [2-13](#)  
 DTE connections [2-10](#)  
 dynamic random-access memory  
     See DRAM.

## E

electrical safety guidelines [2-1](#)  
 electrostatic discharge damage  
     See ESD  
 error messages [A-4](#)  
 ESD [2-2](#)  
 Ethernet cable types [2-9](#)

## F

FDX LED [1-7](#)  
 feet, installing [3-3](#)  
 Figures  
     auxiliary port connection [3-22](#)  
     bracket attachment for rack -mounting [3-6 to 3-10](#)  
     bracket attachment for wall-mounting [3-12](#)  
     brackets, rack mounting [3-4, 3-5](#)  
     chassis views [1-2, 1-3](#)  
     console terminal connection [3-21](#)  
     DC power connections [3-17](#)  
     ground lug attachment [3-14, 3-15](#)  
     LEDs on front panel [1-3](#)  
     LEDs on rear panel [1-5, 1-6, 1-7, 1-8](#)  
     modem connection [3-22](#)  
     mounting brackets [3-4, 3-5](#)  
     rollover cable, identifying [3-22](#)

- rubber feet, locations [3-4](#)
- wall-mounting the chassis [3-13](#)

## Flash memory

- booting from [1-5](#)
- description of [1-2](#)

frame command [B-6](#)

## G

grounding the chassis [3-13](#)

## H

- help command [B-2, B-5](#)
- high temperature, troubleshooting [A-2](#)
- humidity, specifications [1-11, 1-12](#)

## I

i (initialize) command [B-6](#)

## installation

- checklist [2-4](#)
- desktop [3-3](#)
- rack-mounting [3-4](#)
- site requirements [2-3](#)
- tools required [2-6](#)
- wall-mounting [3-11, 3-13](#)

interface numbering [1-9, 1-11](#)

- WAN interface cards [1-9](#)

## IOS software

- locating documentation [xv](#)
- recovering images [B-8](#)

ISDN BRI [2-12 to 2-13](#)

## L

## LAN

- connections [3-18 to 3-19](#)

interface types [2-9](#)

## LEDs

- 100 Mbps, in 1-RU chassis [1-7](#)
- 100 Mbps, in Cisco 2691 [1-8](#)
- ACT, in 1-RU chassis [1-7](#)
- ACT, in Cisco 2691 [1-8](#)
- ACTIVITY, in 1-RU chassis [1-4](#)
- ACTIVITY, in Cisco 2691 [1-4](#)
- CF1, in Cisco 2691 [1-8](#)
- FDX, in 1-RU chassis [1-7](#)
- front panel [1-3 to 1-4](#)
- interpretation of [A-2](#)
- LINK, in 1-RU chassis [1-7](#)
- LINK, in Cisco 2691 [1-8](#)
- Power, in 1-RU chassis [1-3](#)
- Power, in Cisco 2691 [1-4](#)
- rear panel [1-5 to 1-8](#)
- RPS, in 1-RU chassis [1-4](#)
- SYS/RPS, in Cisco 2691 [1-4](#)

lightning safety [2-2](#)

LINK LED [1-7](#)

## M

- meminfo command [B-5, B-6](#)
- memory [1-2 to 1-9](#)
- modem connection [3-21](#)

## N

- netboot [B-4](#)
- network connections [2-8](#)
- network modules, installing [1-8](#)
- nonvolatile random-access memory
  - See NVRAM.
- NVRAM [1-2](#)

## P

packing list [2-6](#)  
 port numbering [1-9](#)  
 power  
   requirements [2-3](#)  
   specifications [1-11 to 1-12](#)  
 power supply connections [3-15 to 3-17](#)  
 power supply LED [1-3 to 1-4](#)

## R

rack-mounting the chassis [3-4 to 3-11](#)  
 racks, equipment [2-4](#)  
 record keeping, site log [2-5](#)  
 regulatory compliance [1-12](#)  
 reload command [B-1, B-2](#)  
 reset command [B-6, B-10](#)  
 rollover cable, identifying [3-22](#)  
 ROM monitor  
   commands [B-2 to B-12](#)  
   syntax [B-3](#)  
   using [B-1](#)  
 rubber feet, installing [3-3](#)

## S

safety  
   guidelines [2-1 to 2-2](#)  
   warnings, translations of [ix](#)  
 SDRAM [1-2](#)  
 serial connections, considerations [2-10](#)  
 serial port specifications [2-11](#)  
 shared memory [1-2](#)  
 show hardware command [B-5](#)  
 show version command [B-5](#)  
 site  
   configuration [2-4](#)  
   environment [2-3](#)

  log, record keeping [2-5](#)  
   requirements [2-3](#)  
 slot numbering [1-11](#)  
 software image recovery procedure [B-8](#)  
 specifications  
   Cisco 261x, Cisco 262x, Cisco 265x [1-11](#)  
   Cisco 2691 [1-12](#)  
   serial ports [2-11](#)  
   system [1-11](#)  
 stack command [B-6](#)  
 static electricity damage [2-2](#)  
 synchronous dynamic random-access memory  
   See SDRAM.  
 sysret command [B-7](#)

## T

### Tables

  cable specifications [3-18](#)  
   configuration register bits [1-1](#)  
   configuration register settings for boot field [1-3](#)  
   configuration register settings for broadcast address [1-4](#)  
   configuration register settings for console terminal baud rate [1-5](#)  
   DC wiring requirements [3-16](#)  
   documents [xv](#)  
   DTE and DCE devices [2-11](#)  
   ISDN-BRI cable specifications [2-13](#)  
   LAN connections [2-9, 3-18](#)  
   LAN interfaces, summary [1-1](#)  
   LEDs on front panel [1-3, 1-4](#)  
   LEDs on rear panel [1-7, 1-8](#)  
   power requirements [2-3](#)  
   related documents [xv](#)  
   serial signal transmission specifications [2-12](#)  
   specifications, system [1-11, 1-12](#)  
   voice connections [3-18](#)  
   WAN connections [3-18](#)  
 telephone jacks, safety during installation [2-2](#)

temperature, operating [1-11, 1-12](#)  
 tftpdnld command [B-6, B-8, B-10](#)  
 Token Ring connections [2-9](#)  
 tools required for installation [2-6](#)  
 troubleshooting  
   cables [A-3](#)  
   connections [A-3](#)  
   cooling system [A-2](#)  
   error messages [A-4](#)  
   front panel LEDs [1-3](#)  
   high temperature [A-2](#)  
   modules [A-3](#)  
   power system [A-2](#)  
   rear panel LEDs [1-5](#)

wiring  
   power supplies [3-15 to 3-17](#)  
   telephone [2-2](#)

---

## X

xmodem command [B-8, B-9](#)

---

## V

ventilation [2-4](#)  
 VICs  
   See voice interface cards.  
 voice interface cards, installing [1-8](#)

---

## W

wall-mounting the chassis [3-11](#)  
 wall-mounting the router [3-12](#)  
 WAN interface cards, installing [1-8](#)  
 Warnings  
   installation [2-1](#)  
   lightning activity [3-15, 3-18](#)  
   main disconnection [3-23](#)  
   secure power cabling [3-17](#)  
   SELV circuit [2-8](#)  
   TN power systems [2-3](#)  
   translations of [ix](#)  
   WAN port voltages [2-12](#)  
 WICs  
   See WAN interface cards

